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Oil, Paint and Drug Reporter

VOLUME 91. NUMBER 7. FRIDAY, FEBRUARY 9, 1917. 100 WILLIAM ST., NEW YORK

THE 1917 ANNUAL REVIEW—EXTRA EDITION

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OIL, PAINT AND DRUG REPORTER

ESTABLISHED 1871.

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Mailed every Saturday, under publication date of the following Monday, by the OIL, PAINT AND DRUG REPORTER, at 100 William Street, New York. William O. Allison, President; D. G. Bogert, Secretary.

SUBSCRIPTION TERMS.—For the United States, $5.00; Canada, $6.00; other foreign countries, $7.00 per annum. All remittances should be made payable to the OIL, PAINT AND DRUG REPORTER.

ADVERTISING RATES will be furnished upon application.

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Entered at the Post Office at New York as second-class matter under the Act of Congress of March 8, 1870.

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VOLUME 91. NUMBER 7. FRIDAY, FEBRUARY 9, 1917. 100 WILLIAM ST., NEW YORK.

Our 1917 Review Number—It Is an Elaboration of Features Customarily Emphasized With Distinctive New Departures.

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WHAT is a review number? Is it simply the presentation of a summary of material already published, although so collated as to be more readily accessible? Is it merely a collection of special articles relating to the subjects considered in the review; or is the first essential the discussion and critical examination of conditions, a revision of previous statements, a perfection of details possibly slighted in the first consideration because of market exigencies, but now presented in perfected form, together with expert analysis of the original conditions, with the best deductions possible to make the final analysis complete and authentic?

We have examined review numbers which were simply compilations of material previously published; we have familiarized ourselves with others which were confined to special articles on market subjects. But, the Annual Review Number of the Reporter herewith submitted, while possessing the essential features of both of these types of reviews, adds to them other newly incorporated material which will be found of unusual interest and of accumulative value.

The annual review of 1917 will be found of dual nature. Not only does it contain analyses of market conditions in every market ordinarily featured in the Reporter—oils, dyes, fertilizers, drugs, chemicals, petroleum and petroleum products, paints and varnishes—together with the record of imports and exports for both the calendar and the fiscal years, 1916, but in addition to this an entire section of 20 pages is given over to a series of industry studies, written especially for this number by representative men in all branches of the industries to the interests of which the Reporter is devoted.

A complete index and table of contents will be found on the opposite page, but attractive though this may be it does little more than indicate the value of the material so carefully compiled for the information and guidance of the Reporter clientele.

For instance, nearly ten pages of the issue are devoted to a comparative tabular presentation of the actual market prices as quoted in New York city for every item in the Reporter markets from the outbreak of the European war, in August, 1914, to January 1, 1917. These price figures are those for the first of every month, by quarters, during this period, and in addition to presenting an invaluable record of price changes, indicate with exactness the periods of highest and lowest prices, the beginning and end of the periods of greatest stringency in supply and of speculative interest, and afford a means of ready comparison of the effect of such price-making factors as freight scarcity, crop and labor shortage and embargo regulations affecting the primary markets in commodities of various types and various derivations.

This tabular comparison of prices alone should insure the preservation of the Review Number for ready reference during the year to come. But, when taken in conjunction with the record of five years' imports and exports for the fiscal year ending June 30, and the calendar year ending December 31, it will be found invaluable.

The treatment of every market in this extra edition of the Reporter is governed by three requisities:—

First, a detailed analytical summary of all the transactions of the year, prices, quantities, new factors entering into production, distribution and consumption.

Second. The best opinion of the best-informed men in that market or industry as to what may be expected during the twelve months to come, based not upon surmise, but upon deductions not only from what has occurred during the past twelve months, but upon the influences underlying these happenings and responsible for them.

Third. Specially written articles by leaders in the industry, in addition to the work of our staff and of our regular correspondents, in which the aim has been constructive helpfulness and the promotion of a more thorough understanding of actual conditions in the industry treated and the possibilities underlying it.

Who, for instance, is better qualified to write analytically upon the growth of the American dyestuff industry—bases, intermediates and the finished colors—than I. Frank Stone, of the National Aniline and Chemical Company; Dr. Thomas H. Norton, dye expert of the Bureau of Foreign and Domestic Commerce; Dr. Bernhard C. Hesse, of the General Chemical Company, and S. R. Church, the head of the Research Department of the Barrett Company?

What men are better informed and better qualified to discuss the petroleum situation, the amounts of crude oil still available, the possible extension of its employment in the industries, and the necessity for conservation of supply and economy of production than Van H. Manning, director of the Bureau of Mines, and Winslow H. Herschell, of the Bureau of Standards?

Who is better qualified to speak for the wholesale drug trade than President James W. Morrisson, of the National Wholesale Druggists' Association, and who knows more intimately the part biological products have played in the world war, both as curative and preventive agents, than President Milton Campbell, of the H. K. Mulford Company?

This list might be continued indefinitely through the entire roster of special contributors who have added the finishing touch of personality to our market studies, thereby enhancing many-fold the value of these records, complete though they may be.

We would also call special attention to the representative firms in many lines whose advertisements are to be found in this issue of the Reporter. For the guidance of advertisers certain publications are rated as double-starred or as "gold star," because of the character of circulation and the number of copies circulated, but, in view of the representative character and progressiveness of the firms advertising in this Annual Review Number, we would be unqualifiedly in favor of establishing a new "gold star list" of advertisers, firms of the highest standing, and of unquestionable worth, among whose names, those appearing in the index of advertisers on the opposite page would take no subordinated position.

Yet, the main purpose of the Reporter's Annual Review Number is to present market studies from all primary sources of its many commodities, derived, as they are, from every section of the globe. The year just closed has been like no other in industrial history, in that a world-war with its embargoes, its scarcity of freight carriers, its lack of labor and intricate foreign exchange arrangements has seriously affected, either for good or for ill, every Reporter market.

Commodities of foreign origin have reflected every change in foreign conditions, with domestic prices directly influenced by the factors enumerated. Domestic markets, with the development of new industries and the tremendous broadening out of production following both foreign and domestic demands, have attained a position hitherto unknown. The result has been a year of contrast—and it is the presentation of this epoch-marking year that is herewith presented in this 1917 Annual Review Number.

The demands upon our staff and upon our correspondents, both in this country and abroad, have, of necessity, been unusual, but the result, it is believed, will be found commensurate with the labor and the expense necessitated by the present elaboration of our usual review. That new times demand new measures was never more truly illustrated than in the progress effected in 1916, and the Reporter, as spokesman for so many important industries, has endeavored to expand to meet these new demands.

We would call particular attention to the close and comprehensive indexes and table of contents on the opposite page, as the medium of ready reference to any market report or other feature in this issue.

The Culmination of 1916's Service by the Reporter but the Beginning of Service for 1917.

THIS extra edition of the Oil, Paint and Drug Reporter, the 1917 Annual Review, is a promise and the fulfilment of a promise. It is the result of the carefully-considered effort of every correspondent of the Reporter, of every member of the Reporter staff, and of the generous co-operation of a group of special contributors from every branch of endeavor in the industries and sciences which the Reporter has the honor to represent.

Never before has there been presented in one edition of any trade publication any similar coordinated group of the facts of production, sales, distribution and development of markets, which, while allied in the trades, differ so radically in so many characteristics.

It is something more than a record of mere trade facts, comprehensive as such records will be found to be, for in the score of special articles by leaders in their lines of endeavor there is a definite promise for the future, based upon careful, intimate, expert study of the conditions of the past. We bespeak for them the attention the high character of the writers and the material written especially for this publication so fully deserves.

If one single thought could be emphasized as the guiding motive of the Reporter and of those who have contributed to this extra edition—often at personal inconvenience because of business stress—it would be SERVICE. The lessons of the past twelve months, and of the years preceding, have been epitomized in constructive recapitulations which cannot but prove of infinite assistance to those seeking both definitive data and accurate first-hand information.

No such compilation as this culmination of Reporter service would be possible without the facilities perfected during its 46 years of continuous publication, and the consequent intimate touch with men and affairs gained through the contact of our staff with actual conditions. The Reporter's corps of special correspondents in all the trade centers of the United States and in the primary markets of the world, reporting by mail, by cable and by telegraph; its facilities in London and Washington through its special bureaus for the immediate analysis of European trade edict and American legislative measures; its close touch with departments having supervision of details relating to its markets; its interpretations from the source of trade rulings and regulations—these are standard features of Reporter SERVICE.

But, combined with these factors, is the feature of individual service—the placing of readers and advertisers in touch with producers, handlers and distributors; the search for specific information desired upon some subject of direct personal application to some one member of the Reporter clientele, such as the range of prices for specified commodities during certain periods; in fact, Reporter service is directly personal in that its extent and its value to its readers are increased at will at the expressed desire of the readers themselves.

Reporter service is the result of co-operative effort, just as this Annual Review has been made possible through co-operation on the part of correspondents, advertisers and members of the Reporter clientele, and in the perfection of such co-operation during the months to come lies the best promise of still more efficient service in 1917 and years subsequent thereto.

HOW REPRESENTATIVE MEN IN REPORTER INDUSTRIES SUMMARIZE 1916.

(*For Additional Outlook and Retrospect Letters See Page* 150.)

F. W. WELLER

Vice President Standard Oil Company of New Jersey.

Owing to the unprecedented demand for petroleum products the year 1916 has been a prosperous one in all branches of the business.

During the year the total production exceeded that of 1915, but the growth in the demand was greater than the increase in production, and this situation is being reflected by advancing prices in crude.

The brisk demand for the past two years has so stimulated the construction of refining facilities that this capacity is now in excess of production of crude.

Outside capital has been used largely in providing this excess, and when the lean years come, as they do with great regularity in this business, this new capital will be brought to a realizing sense that it is uneconomic to pay fancy prices for their production or refining capacity.

However, concerns that have been conservatively operated will probably, on account of the demand, continue to enjoy prosperity during the current year.

CHARLES J. LYNN

Secretary and General Manager Eli Lilly & Co., Indianapolis, Ind.

The past year has been a strenuous one. Unprecedented volume of domestic business, high prices, difficulty in obtaining various supplies, raw and finished, slow freight service both inbound and outbound, scarcity of certain classes of labor, fuel shortage, etc., all have combined to make 1916 one long to be remembered in the history of this house. Customers have been patient, no doubt realizing that our story was but a repetition of that of other manufacturers—all working under pressure to satisfy the demand.

We see no indications of any reduction in the volume of business nor do we expect any so long as present world conditions endure. Certain conditions of manufacture are improving, but no doubt as long as the war lasts our business will be done under more or less trying conditions.

What will happen to our industry when peace actually comes is more or less problematical, but that business generally, including drugs, is due for a decided shake-up in the inevitable readjustment ahead is plainly evident from what happened recently in Wall street, on more rumors of peace. We are inclined to the opinion, however, that legitimate industry in this country will move along under its present momentum for some time after the actual declaration of peace before the readjustment comes.

JOSEPH PLAUT

President Lehn & Fink, New York City.

We are free to state that in the past year, notwithstanding higher prices of products and consequent restricted consumption, the volume of business showed a notable increase. Many articles were omitted from shipments because it was impossible to obtain them, and the continued and extreme fluctuations in the price of goods lent uncertainty to the conduct of business. The demand for merchandise was uninterruptedly brisk; collections showed some improvement, and the net result was gratifying, although more or less friction and tension were exhibited, largely due to the difficulty in securing satisfactory help. The employment problem was ever present.

For the new year the outlook is reassuring, with domestic trade lively and the hoped-for advent of peace in Europe a factor which does not materially affect the immediate situation.

WILLIAM L. BROWER

Vice-President Schieffelin & Co., New York City.

We regard the business in the wholesale drug trade as being on a sound basis and of a satisfactory nature, both in volume and as to profits. The political developments, beginning in December of 1916, do not seem to have wrought any marked change in the volume of business, and this particular business being of a stable nature we do not anticipate any adverse change in the near future.

During the year just closed there was some recession in the prices of drugs and chemicals of foreign origin, in some instances due to the ability of American manufacturers to supply the shortage created by the hostilities in Europe. These declines have, however, been more than offset by increase in the prices of goods of purely domestic origin where manufacturers have not been able to supply the large demand from foreign countries.

Collections are in excellent condition.

We anticipate a large and profitable business during the year 1917.

M. CAREY PETER

Peter-Neat-Richardson Company, Louisville, Ky.

We do not find any material difference in last year's business from that of several years preceding. It has been a good year. Collections are good. Crops are fine and they bring good prices.

We see nothing in future that is at all alarming or that would indicate any change from these conditions. Of course, we have not felt the effect of the enormous demand for munitions that has made things throb so rapidly on the seashore, but in a quiet way we sit under the pawpaw bush and go along with our Panama hats in the summer and snow shoes in winter and love our friends; enjoy what we eat; never drink more than we want and are happy.

WM. A. HAMANN

Treasurer Roessler & Hasslacher Chemical Company, New York.

Like its predecessors, the past year has been replete with disappointments, surprises and profits. The demand for chemicals has been phenomenal from pretty nearly every source of consumption, and from every section of the country. Where the supply has been short the pressure of buyers to secure more than their share has in many instances sent prices to fabulous heights; such conditions have brought exceptional profits, but little real satisfaction.

Taking everything into consideration, we believe we voice the general sentiment when we say, "Let us hope we can get back to normal conditions soon."

The new year will in a measure repeat the past years' experiences, at least as long as the world war lasts, and we sincerely trust that this may end at an early date.

FRANK G. RYAN

President Parke, Davis & Co., Detroit, Mich.

The year 1916 has been the most remarkable for volume of business of any in our experience, the output of products being limited only to our capacity to manufacture and ability to secure supplies. The excessive demand for pharmaceutical products still continues, and in so far as we are able to judge, will continue for at least another year. We would not care to venture an opinion as to the effect on business of a sudden termination of the war, although we can hardly see how this would lessen the consumption of regular pharmaceutical products in the United States.

WILLIAM H. CLARK

General Sales Manager Butterworth-Judson Corporation.

We are pleased to report a very successful period during 1916, the volume of business being the largest this company has ever done. The most encouraging feature has been that while in 1915 the chief impetus to chemical manufacture came from European demands, during 1916 the demand has been shifting from war sources to domestic organic chemical industries which have sprung up all through the East, engaged chiefly in the manufacture of coal-tar products, dyes, and intermediates. This feature speaks very well for the continuance of a healthy and increasing local market and bids fair to sustain activity in chemicals in spite of the decreasing European outlet.

We see no reason why this country should not be able in a very short time to stand on its own bottom, entirely independent of foreign chemicals, and the rapidity with which the coal-tar derivative industries are developing carries conviction that it will do so.

LUTHER MARTIN

Vice-President Wilckes Martin Wilckes Company, New York.

We had a most unusual year and we believe this was the case with all the manufacturers in this country owing to conditions. The volume of business was all that could be desired. Of course, the large manufacturers were under contract to make deliveries to their customers at the old prices, and many of these contracts worked a hardship on the producers under the changed conditions of manufacture, viz., higher wages, increased cost of raw materials, etc.

The new year has started off well, and evidently the consumers feel that business is going to be almost up to last year, for the reason that most of them have been anxious to contract for their requirements so far ahead. Our personal view is that 1917 will be another good year, because even if the hostilities in Europe should cease by the middle of summer or beginning of the fall months, in the short remaining period there could not be any changes which would affect the market here on stable articles.

E. V. PETERS

Assistant General Sales Manager New Jersey Zinc Company.

To us it appears that we may all look forward to a period of continued business activity for some time to come. Fundamentally, domestic business is in excellent position. The country has enjoyed for some time past a period of unusual prosperity, permitting many new industries to become permanently established and financially strengthening many other older establishments; thus a potential capacity has been created which augurs well for future and continued activity.

Prices of raw materials have been and still are high, but, notwithstanding this, paint manufacturers during the year just closed appear to have suffered no appreciable diminution of demand, and the outlook for the coming year as far as may be judged from present indications is most encouraging. While prices generally are much above the level to which we have been accustomed, money is also more plentiful and more widely distributed than ever before, and the advanced prices of materials seem to have had but little, if any, effect on consumption.

In zinc oxides, both French and American processes, including the leaded grades, demand has steadily increased, and we see nothing that warrants the expectation of any change in this condition. The demand for the standard grades of the Horse Head zinc oxides has been in excess of the productive capacity, and any relief in this direction must come from a larger use of the leaded grades, the production of which is more elastic. The paint trade in general appears to have realized this fact, and have found these grades of leaded oxides to be in every way satisfactory for the manufacture of high quality paints, and as a consequence of this realization, fortified by practical experience, many of the larger manufacturers are now specifying a preponderance of these grades.

In view of continued business activity our transportation agencies appear to be taxed beyond their capacity, as shippers realize. Car shortage and embargoes will continue to be awkward factors, and it, therefore, seems wise to give this phase of the situation earnest consideration. We believe much can be done to relieve this congestion if purchasers will advise the shippers well in advance of their requirements, and if a concerted movement to load cars to capacity were inaugurated.

W. E. WALL

President the Fred G. Clark Company, Cleveland, Ohio.

I think it is fair to say that the oil and chemical business will show profits in line with business in general. It might be said that business for the last year was very good, but nothing extra as compared with general conditions. The coming year bids to be quite as good as last year, although there is considerable disturbance in the manner in which crude oil is handled.

This is a branch of the business at which a better understanding is arrived between the producer and the purchaser of the raw material. There is too much speculative feature about it entirely.

Of course, all business has shown a larger profit since the war than before, but personally I think we would all be much better off in the long run if there had been no war, and we were going on contented with conditions as we had them before the war. I am a thorough believer that we will pass through a very serious condition when things become normal again. The war will end one of these days. Will we be prepared commercially to adjust ourselves to radically different conditions?

J. L. BRODE

F. W. Brode & Co., Memphis, Tenn.

The value of cottonseed oil broke all records this season, as was the case in many other commodities. However, it is now at a more reasonable basis, and trade in it is beginning to pick up to some extent. We hear of rumors of a failure of the olive oil crop abroad, which is stimulating to holders of crude.

For the most part, the small oil mills are sold up. Most of the big mills are also comfortably fixed, and so far as the statistical position is concerned, there is very little hope of the market fluctuating widely at the present time. There is some little hand-to-mouth buying going on, which is relieving the market of the small offerings which come out from time to time. Soya bean oil is coming into this country, but there seems to be quite a demand for it. Offerings are well taken.

Owing to the high prices that have been paid for seed, the mills now seem determined to market their products to the best advantage to themselves, and it is not to be expected that they will be stampeded into any big selling; at the same time buyers are also indifferent, as they are fairly well fixed so far as supply is concerned, and until some new features come into the situation, there will be no tendency either way.

ISAAC WINKLER & BRO.

New York City.

Trade for the year just past has proven satisfactory, although it was transacted under serious disabilities. The prospects for 1917 are bright, but final results depend on outside circumstances, as for instance, the labor situation, car shortage, ability to secure adequate supplies of fuel, raw material, etc.

W. H. KNAPP

Assistant to President the Solvay Process Company, Syracuse, N. Y.

During last year our business has been extremely active. The European war has indirectly stimulated very greatly the domestic consumption of soda ash, caustic soda, and the other allied products manufactured by us. Increased producing capacity and the most active effort in all lines has been necessary to place us in a position to meet the heavy demands the market has made upon us.

We expect a continuation of the present condition during 1917, and are preparing to meet very heavy demands for our particular product.

THE DEVELOPMENT OF THE ANILINE COLOR MANUFACTURING INDUSTRY IN AMERICA.

By I. F. STONE, President of the National Aniline and Chemical Company; Vice-President of Schoellkopf Aniline and Chemical Works, Inc., Buffalo, N. Y.

IN writing on this subject it may be interesting to briefly sketch in the beginning a history of this industry from its first inception in this country, and I beg to say in this connection that the first American aniline factories were established about 1875. By about 1880 there were some ten factories engaged in the manufacture of these products, and it looked as though it would be a very successful industry, as tariff conditions at that time were favorable to such enterprise.

Unfortunately, however, in 1883 a new tariff law was passed, reducing the tariff protection on colors to such an extent that the industry was no longer possible, and consequently most of the factories dropped out until at one time there were only three engaged in this manufacture, and these three were carried on more or less by the ambition of their owners that some day conditions would be changed, rather than at a profit. One of the factories, particularly, lost a large amount of money up to the time it finally reached success in about 1900.

Five Factories Operating in 1914.

About 1898 another factory was established and then along about 1914 still another was established, so that in 1914, at the beginning of the present European war, there were five factories actively engaged in this industry. Owing, however, to the intense competition of the European manufacturers, especially the Germans, none of these factories were successful enough to make a complete line of colors, and were restricted to only a few of those which could be made to advantage in this country, therefore the industry was not a large one and was not running to any considerable extent.

One reason why the industry could not operate successfully was the lack of what we call intermediate products, that is, products made from benzole and naphehtlene (coal tar derivatives) which are the bases of the manufacturing of practically all aniline colors, as none of these intermediate products were manufactured in this country up to 1914, when the war commenced, with one exception which I will mention later.

The American manufacturers were therefore obliged to rely entirely upon European factories for their raw materials, in other words, the intermediate products, and naturally, the European manufacturers charged them such a price that they could not successfully compete with the finished colors of Europe, which were made from the same intermediate products, but which were secured by the European manufacturers naturally at a lower price than they could be secured by the American manufacturers who imported them.

The single exception to this statement is that in 1910 a factory for the manufacture of one of the intermediates, viz. aniline oil, was established, but had not been at all successful up to the time of the war, owing to European competition, the European manufacturers, by the way, having reduced their price immediately upon the establishment of this American factory.

No Intermediates Made Here But Aniline Oil.

The situation was then, in 1914, when the war began, that no intermediate raw materials were manufactured here with the exception of this comparatively small amount of aniline oil, and then the supplies of these intermediate products from European factories, that is, German factories, were immediately cut off, just as were the supplies of the finished aniline colors, and the American manufacturers therefore were not able to relieve the situation except to the extent of using up what raw materials they had on hand, which of course were not nearly enough to be of any perceptible help to the consumers of aniline dyes.

The situation therefore a few months after the war started, say about January 1, 1915, had become very acute, as practically all the stocks of imported colors which were here at the beginning of the war had been consumed, as had also the raw materials employed by the American factories in their manufacture of colors, the one exception being a factory which had previously been securing its aniline oil from the American manufacturer, and therefore they were enabled to continue this manufacture of colors without any particular interruption, except the interruption of the lack of foreign intermediates, of which, however, they fortunately had a large stock.

I am not mentioning the names of any of these factories, in this article, as I wish to be absolutely impersonal, but there is no question but that the position of this factory just mentioned, with its supply of raw materials, was a great relief to the consumers of dyes in this country, and it was very fortunate for them that a factory had been established for the manufacture of aniline oil, and that as American manufacturers of colors they had taken the precaution to secure their supply from this American factory, even though they were obliged to pay a higher price than they could have imported the oil for at the time. They preferred, however, to do this in order to encourage the American manufacturers of these intermediate products.

Very soon after the war began, however, it became apparent that there would be a great necessity for the manufacture of these intermediate products in this country, and as the basic material, that is, coal tar, is of course a large domestic product, it was then only necessary to recover its derivatives such as benzole and naphthalene, and benzole, particularly being needed for explosives and other war purposes, was the first product which had the attention of the American producers.

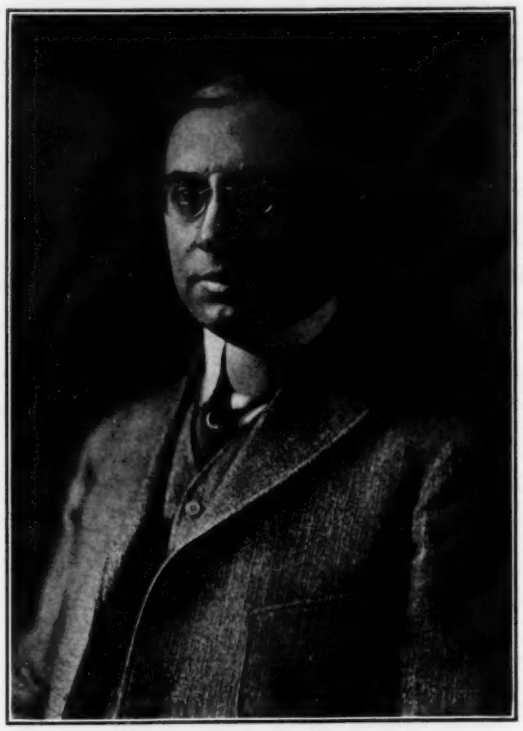
The production was increased gradually until it has reached at the present time something like 30,000,000 gallons annually as against about 3,000,000 gallons prior to the war, and the production of naphthalene has also increased largely owing to its demand for use as a raw material in the manufacture of these intermediates, although not to such an extent as benzole.

Fair Supply of Intermediates Now Available.

The manufacture of intermediates gradually increased to such an extent that there are now being manufactured a large variety, such as alpha-naphtylamine, beta-naphthol, benzaldehyde, benzyl acetate, chlor-benzole, dimethylaniline, di-nitro-benzole, di-nitro-phenol, nitro benzole, paranitraniline, paraphenylenediamine, toluidine, and others too numerous to mention, so that American manufacturers of colors are now able to get a fair supply of these intermediates, and are therefore enabled to make a more complete line of colors than was possible at the beginning of the war, viz., 1914.

As I have previously mentioned, the first large intermediate to be manufactured, however, was aniline oil, the factory which originally manufactured it before the war, immediately increasing its production, and many other concerns starting in later on, until it came to a point where the production was fully if not more than equal to the demand, and the fact is, that **factories making this product are in such a strong position that it is doubtful whether it will ever again be imported from Europe to advantage.**

ISAAC FRANK STONE
President of the National Aniline and Chemical Company of New York City.



One of the most prominent companies in the field of chemical dyestuffs manufacture since the European war began has been the National Aniline and Chemical Company, of which for ten years I. Frank Stone has been the head.

Mr. Stone was born in Chicago, March 2, 1867, attended the Chicago schools, and left school at an early age to enter business. He was just 21 when he started the firm of I. F. Stone. The new undertaking prospered, and in 1890 the firm became Stone & Ware, entering New York city seven years later as the Stone & Ware Company.

Three years later Mr. Stone became vice-president of the Schoellkopf, Hartford & Hanna Company, and in 1906 president of the National Aniline and Chemical Company. He assumed direction of the business at a moment when it was just entering upon the growth that has marked its subsequent development. Every year has witnessed extension of manufacturing facilities and increased production. His policy has been of the aggressive kind that always contemplates taking another step forward the moment such step is justified.

Mr. Stone has given a good share of his time to fostering the interests of the whole industry, and he also is connected with several other companies in the chemical trade, being a director and vice-president of the Schoellkopf Aniline and Chemical Works, Inc., and a director of the Contact Process Company, and Rollin Chemical Company.

He is a director of the Importers' and Traders' National Bank, and for some time has been on the Advisory Committee of the Metropolitan Bank.

In 1909 Mr. Stone was elected vice-president of the Drug and Chemical Club, and the next year was chosen president of the Chemists' Club of New York. He is a member of the Chamber of Commerce, Board of Trade and Transportation, Lotos, Union League, New York Athletic and City Clubs.

Another intermediate, the manufacture of which was commenced largely, was chlor-benzole, which is used in the manufacture of sulphur black, a very important color for cotton goods, and for which there is a large sale. The manufacture of this color, by the way, is now so large that it is fully equal to the consumption, and is again another product which will probably never be imported again to advantage. Other intermediates follow, until, as I have said, at present we are able to obtain a sufficient variety to manufacture a line of colors which will probably take care of the necessary shades, which includes blacks, blues, browns, reds, yellows, greens, orange, violet; the seven primary colors, from mixtures of which practically every shade can be obtained for all materials such as wool, cotton and silk.

It has been stated that American manufacturers were not on a firm basis, in that they had followed the lines of least resistance in making colors, that is, making colors which were easiest to manufacture, and that when the war was over and competition came again from Europe they would not be able to stand against the competition. This opinion is not true, in that while it is true that they did follow the lines of least resistance, it so happened that the colors manufactured were the ones most largely consumed, for instance blacks. This is by far the color most largely consumed, being practically half of the entire color consumption of the country, and this was the first color to receive attention of the American manufacturers, it being obvious that a color which could be manufactured in large quantities would mean a less cost for overhead expenses.

Therefore there is now an abundance of blacks made for all purposes, sufficient to take care of the whole consumption of the country, for instance:—Direct blacks for cotton, union, wool and silk, azo black or acid black for wool and silk, sulphur black for cotton (already mentioned), chrome blacks for wool, and nigrosines for leather, inks, etc., so that this particular color is very well taken care of.

Consumers can get the necessary quantities for consumption next year if they were careful to contract for same in time to allow the American manufacturers to arrange their facilities and buy the raw material necessary to take care of such contracts, for 1917.

Satisfactory Blues Produced Also.

The next color in importance, which had their attention, was blue, this being next to black in the proportion of consumption. They are now producing blues for the same textiles, viz., wool, cotton and silk, to a very satisfactory extent.

To show the development of this business, would say when we consider that there were only five factories making aniline dyes in the country prior to the fall of 1914 when the war began, I will say that **we now have a list of about 120 making intermediates and anilines, and as I have stated above, their whole production will take care of the entire country as far as the necessary colors are concerned.**

Special colors which are not made here, are being imported from Switzerland, and occasionally on the submarine Deutschland, so that consumers are able to get quite a varied line, and there is therefore now no real shortage of these products.

Vat Colors Not Yet Made in Large Amounts.

Practically the only colors which are not now made in this country of any consequence, are indigo and anthracene derivatives, known as vat colors, for the dyeing of ginghams, shirtings, etc. (although at this time there is one factory being erected for the manufacture of indigo), but it is possible to secure natural products like indigo, logwood, fustic, cutch, flavine, etc., which can be substituted until the artificial colors are either manufactured or again imported.

And then alizarine colors, for which there is as far as I know no plan to manufacture, are easily replaced by the so-called chrome colors, which are practically as fast and available for men's wear, sweaters, heavy woolens, etc., in black, blue, brown, green, yellow and red, therefore the shortage of these alizarines is really not so serious, and then, there are some colors for lakes called the para colors, which are not made here, but the lake manufacturers can easily get what they want by making their own lakes from paranitraniline and beta-naphthol, which are made here. A few other colors not made here, are such specialties as rhodamine, auramine, patent blue, etc., but some are being brought over from Switzerland and England, and from Germany (on the Deutschland in fair quantities, so that they are obtainable, and can be used in connection with American colors for blending shades and making mixtures.

In speaking of the increase to some 120 factories, I must emphasize the fact that the first five already established before the war are the ones who have made the most progress and are the ones turning out the most staple and satisfactory colors as to quality, &c., and they are the ones who will continue to hold the most of the business after the war as, due to their experience, capital, &c., they are in a better position to do so than the newer manufacturers who have largely depended on inexperienced chemists and

on outside capital to take up the manufacture.

This is emphasized by the fact that none of the older factories are advertising their stock for sale in the newspapers, nor are they soliciting subscriptions for bonds or in any other way asking for capital, as all of them seem to be in position to capitalize themselves. This being true, they certainly are in a strong position to meet competition after the war, with the advantage they have gained in the meantime through their development and increased production, which will reduce overhead expenses of their factories, as it is obvious that it will not cost as much per pound to manufacture, say, 1,000,000 pounds, as it would to manufacture 100,000 pounds—the increase in the manufacture of colors being at least ten times more than it was before the war.

The principal point to continue the successful manufacture is the question of the manufacture of the intermediates, on which they depend as their raw materials, and it is the intermediate manufacturers who will need the most help to maintain their position. If they cannot do so through protection granted them by Congress in the last tariff bill, then they should be supported in some other way, by the government, for instance, as I have stated in an address made last year, the government could establish factories for the manufacture of these intermediates, which would be very desirable, because these same factories could be used for the manufacture of ammunition supplies in case of war, as it is a fact that the raw materials for the manufacture of aniline products are much the same as those used for explosives, so that in making such a move the government would be protecting itself, in case of war, for its supply of explosives, as well as strengthening the position of the aniline color manufacturers by giving them intermediates at necessary prices. This could be easily done by the government, as it is a fact, as I have stated, that the production of the original raw material, coal tar derivatives, viz., benzole and napthalene, are now in sufficient supply for the production of all necessary intermediates.

U. S. Products Identical with European.

There is some criticism as to the quality of the coal-tar products made in the United States since the war, but to this I can say that they are identically the same in every respect as the European products, as they are made from the same chemical formulae, and there is no reason, therefore, why they should not be fully as good in every way if they are properly manufactured, which they are, by the competent factories. The trouble is that people, in comparing colors, do not compare the same colors but take some color, which is especially adapted for certain purposes, and compare it with colors which may be used for the purpose but are not so well adapted, due usually to the ignorance of the people who use colors, but they could get the necessary information as to what colors to use if they would confer with some more experienced manufacturers of colors, who would know just for which purpose colors are adapted and what colors could be replaced, in comparison with the European colors.

In regard to the high prices charged by American manufacturers of colors, many consumers are under the impression that these are caused by scarcity, owing to the inability of European manufacturers to deliver their products here, but while this may be true to some extent, the real reason is that owing to the fact, as I have said, that

the raw materials for the manufacture of aniline colors are much the same as those used for explosives, the war demands for explosives are so great that it creates a scarcity in the raw materials, and consequently prices are high, and color manufacturers are obliged to pay abnormal prices for their raw material, so that the prices for the manufactured colors are correspondingly high.

Not only that, but the cost of labor in the past two years has advanced to such an extent that it is almost double what it was in the normal times. However, the price of American colors, in any event, is not as high, in proportion, as the European colors, as those colors which are imported are sold for many times more their normal value in this country than are the American colors. For instance, a color known as patent blue, on which the normal price is about $1, is being sold as high as $13 per pound for a type which is only half strength, so, in reality, the full strength type would be selling at $26, or about twenty-six times its normal price, while I know of no American color which is sold at more than about ten times its normal price, and most of the staples are sold at about only five times—for instance, direct and sulphur black, which are consumed in the largest quantities.

It is usually the smaller colors which are higher in proportion, due to the fact that the cost of manufacture is more for small quantities than it is for large quantities. In mentioning patent blue, it is only one of many colors, like rhodamine, auramine, the vat colors already mentioned, &c., which come over from time to time, and which are sold at very high prices, much more in proportion than the American colors. The point is that the prices in Europe are evidently quite as high or higher than they are in the United States; therefore the United States consumer is under no disadvantage as compared to consumers in other parts of the world. As to when products will be back to their normal prices, would say this will come in due course, after the war, and when things get more normal; that is, when materials and labor once more resume normal conditions, although, as far as labor is concerned, it is very difficult to say whether this will again in this country go back to what it was before the war, our laboring people having been educated now to a higher schedule of living, and it is doubtful if conditions will change much in this respect, as it would be difficult to return to a different or former standard.

I believe, however, that American consumers will be only too glad to pay labor everything it is worth and consequently a higher price for colors than ruled before the war will be cheerfully paid by our consumers, if they are within reason, which they will be.

To sum up what is now being manufactured, would say that practically a full line of basic, acid, chrome and sulphur colors are being made, and people, in criticising the development of the color manufacture, should not forget that it would be impossible for us to do in two years since the war what it has taken Germany over fifty years to accomplish; in other words, make a complete line of colors for every purpose, but in making the staple colors, such as we have been able to do, and getting them to a point where we can supply the whole consumption of the country, I think we have accomplished wonders in the short period since the war, or a little over two years.

The definite answer in connection with the manufacture of dyestuffs in America is therefore, as I have already stated, that the present conditions of the dyestuff supply are very satisfactory and the future outlook is still more satisfactory in that we will make more colors, and everything indicates that the larger part of the business will remain in the hands of American manufacturers even after the war, instead of the hands of the European manufacturers who in former years have had a practical monopoly of this business.

THE CHEMIST IN THE DEVELOPMENT OF THE COAL-TAR DYE INDUSTRY.

By DR. BERNHARD C. HESSE, New York City.

ALL but two of the coal-tar dyes on the world's markets have no counterpart in nature; they are all invented dyes. For those two exceptions, Alizarin and Indigo, invention of processes for their synthetic production had to be accomplished. So far as processes are concerned all coal-tar dyes are made by invented processes and all the dyes but two are invented dyes.

The Schultz "Farbstofftabellen" (Edition of 1914) state that 921 different chemical individuals, in a number of brands for each, were on the world's dye markets in 1912. If the "Dyestuff Census" of Dr. Thomas H. Norton be suitably examined it will appear that about 534 of the 921 Schultz numbers were imported into the United States during the fiscal year 1913-1914. Of these 534 about 258 were brought in in lots of 5 short tons or more per year and about 275 were brought in in lots of less than 5 short tons per year. It should be borne in mind that the Norton Dyestuff Census lists about 5,674 different brands which are referred to 2,127 different numbered entries, 534 of which are Schultz table entries, over 400 are tentatively assigned to Schultz table numbers and for over 1,180 entries (weighing about 4,300 tons) in this Dyestuff Census no composition is indicated.

Limiting attention now to 533 of these 534 Schultz table numbers (exclusive of Indigo) it also appears on suitable examination of the Norton Dyestuff Census that the amounts brought in under these designations total upwards of 8,000 tons; on an assumed total United States consumption of 29,000 short tons this represents 27.6 per cent. of the total United States yearly consumption. Further, that at the end of 1913 over 78 per cent. of these 8,000 tons were free of any United States patent restraint and that of these 78per cent., 42 had never been patented in the United States.

Indigo imports make up about 4,000 tons of the 29,000, leaving 12,700 tons to be distributed over the dyes tentatively assigned to Schultz table numbers and those dyes manufactured in the country. On the basis of 25,000 tons to account for, the 8,000 definitely assigned to Schultz table numbers amount to 32 per cent. of that amount.

The following table gives some of the detail derivable from suitable treatment of the Norton Dyestuff Census. In this table, 1 per cent. equals 80 tons. Hence, of the dyes imported into the United States in 1913-1914, 640 tons were made up of 20 dyes all discovered in 1868 or prior thereto and never patented in the United States; this is an average of 32 tons per dye as against a grand average of 15 tons for these 533 Schultz table entries.

Distribution of Patented and Non-Patented Dyes.

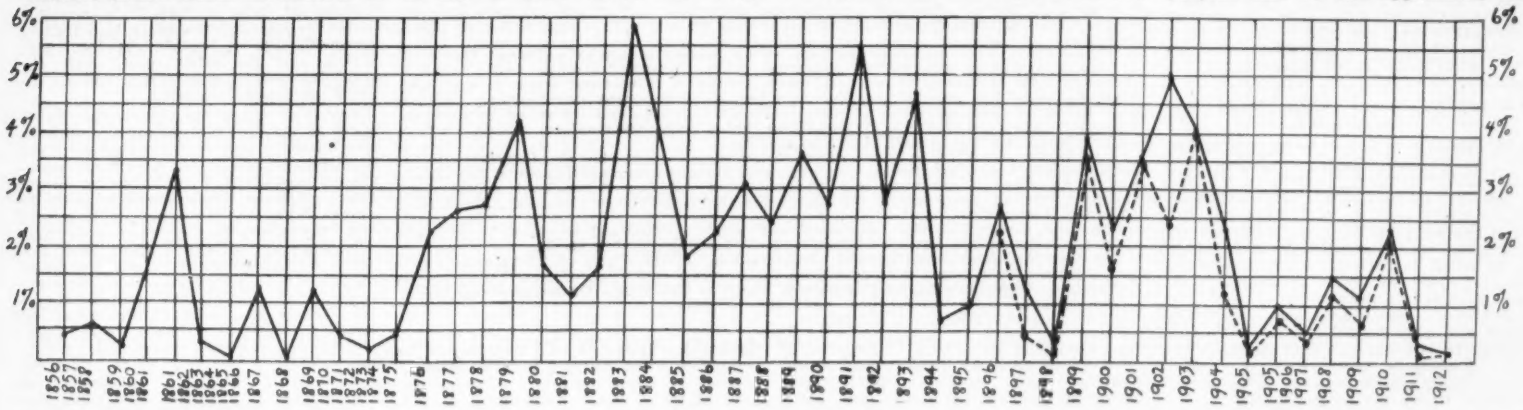
The chart herewith shows the figures of the table plotted in per cent. of the 8,000 tons against years; the solid line shows the total of patented and non-patented dyes for the respective years; the dotted line, beginning with 1896 shows the participation of dyes then patented in the United States on the assumption that all United States patents prior to 1896 had expired with 1913; this shows graphically and approximately the distribution between patented and unpatented dyes at or about the outbreak of the present European war; the "peaks" are at 1885, 1891 and 1902. These may be regarded as the three "fat" years for inventors of dyes; the other years are relatively less "fat," i. e., "lean."

It appears, therefore, from the foregoing that not all invented dyes are patentable dyes. Closer study of the dye individuals shows that, in general, for every patented dye there was soon thereafter on the market a patented or a non-patented equivalent. Except in very rare cases was any one concern able to shut out all competition along any specific line by patents. In this connection it is worthy of note that during the past decade or decade and a half, the chief development in new dyes has been in lake or pigment colors, sulfur colors and vat dyes (the so-called indigoids), and that no one concern and no one country had an absolute monopoly in these lines. Of course this necessitates that research be done in order to invent new dyes and then these dyes have to be tested out on a small scale and then put to the test of competitive markets. In other words, to be permanently and prominently in the coal tar dye business you must be on the look out for something that is better in one or more respects than things then on the market. That means you must do research work, and to do this you must have well equipped and well manned research laboratories. The inspiration to research comes from two directions: the by-product of the plant itself and the general progress of the art itself, inclusive of the competitors.

Why Coal Tar Dyes Become Obsolete.

Specific coal tar dyes do not, as a rule, become obsolete because of changing fashions, fads or fancies, but they become so because better dyes are discovered and exploited.

Blacks are always in fashion and so are blues, reds and yellows. The markets of the world are simply littered with a large number of obsolete dyes for those shades, all made so because better ones have been invented. There can be only one best dye for a given purpose and no one appreciates and practices that more than do those who have developed this industry, and it is a simple but important lesson that those who intend to enter this field must learn and practice. There is no reason whatever to believe that the number of dyes on the world's markets will decrease, and there is every reason to expect them to increase in number for some time to come. The great future lies along the line of vat dyes, as a glance at the Norton Dye Census



The above chart shows the distribution of patented and unpatented dyes for the respective years indicated in the lower margin, the percentage being of the 8,000-ton total for the years up to the outbreak of the European war. The heavy line shows the total of patented and non-patented dyes for the respective years; the dotted line, which begins in 1896, shows the participation of dyes then patented in the United States. The three best years for the inventors of dyes are thus shown to be 1883, 1891 and 1902.

will readily show, not only for individual tonnage but for individual values as well.

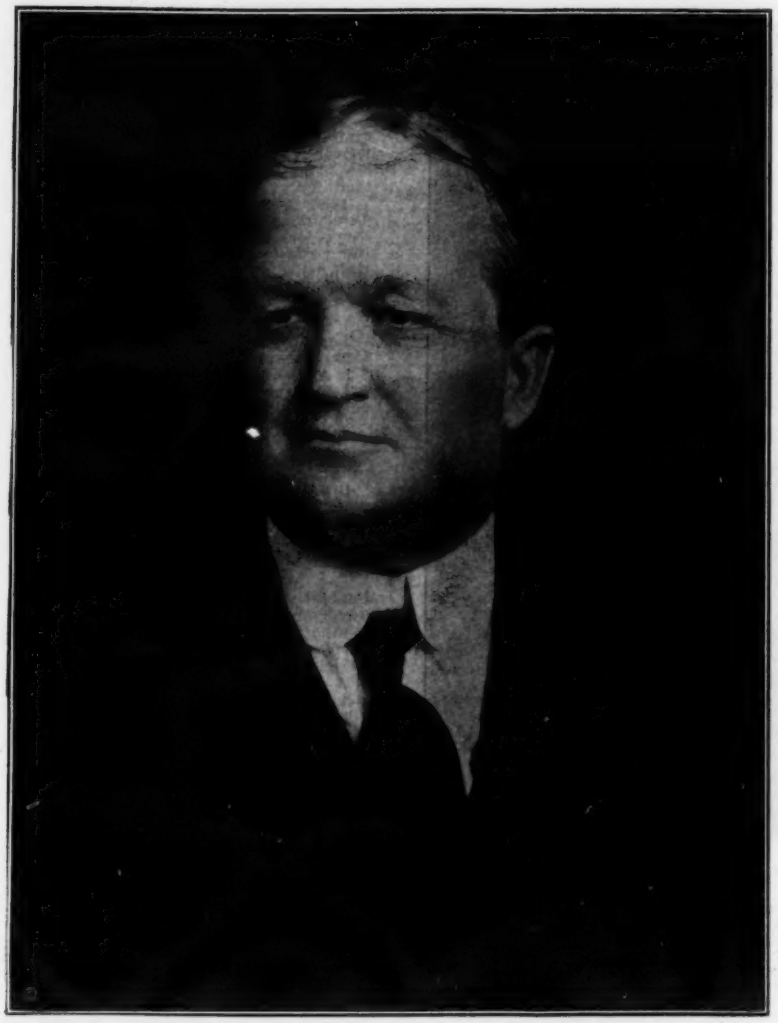
A healthy domestic dye industry will be called upon not only to deliver the "old-timers" in good quality, but also the newer dyes or equivalents for them. The former calls now primarily for engineering skill and manufacturing technique, largely under the guidance of chemists; the latter calls for initiative and successful research, which must be carried out by men whose sole job it to keep an eye on what the science, the art and the markets have in store and to forestall or blanket competitors as well as conditions will prmit This is all the more important since signs are not wanting that new developments along lines more complex than heretofore from a research, manufacturing and merchandizing point of view are imminent. Whether they will be permanent or not no one can tell; the research chemist is the only man who can safely meet that situation, if it can be met, and there is every reason to believe that it can be met if gone about with foresight, sagacity and determination. The pride of to-day may well be tomorrow's "has-been" and the Norton Dye Census shows this more conclusively than any recital could, especially if read in connection with the earlier editions of the Schultz Tables.

Part Played by Research Chemist.

The research chemist is, therefore, the mainspring of the development and improvement of the coal tar dye business To do without research makes any effort along these lines a mere "trailing" enterprise, and such can expect merely to get the crumbs from the table of those wo go at this business with the determination to get the newest as well as the best of both old and new, and this cannot be done by any magic. It calls for alertness and much work—all summed up in the word "Research."

There are many "lemons" in the garden of research and the winners must pay for them and they must make their money quick, for few things are of more uncertain commercial life than the majority of coal tar dyes. We have applied research and service to many of our domestic enterprises with a skill, foresight, sagacity and success that matches anything in the coal tar dye business, and there is every reason to expect that we can do it there if we want to and are convinced of its necessity.

BERNHARD CONRAD HESSE.



Bernhard C. Hesse, author of the special article printed herewith, and one of the best posted men on the dyestuffs industry in this country, was born in East Saginaw, Mich., October 3, 1869. Educated in the public schools, the University of Michigan and the University of Chicago, he started in business as an errand boy in a drug store—1884-1887. He studied pharmacy at the University of Michigan in 1887-1889, receiving the degree of pharmaceutical chemist in 1889. From October, 1890, to July, 1893, he was assistant in qualitative analysis at the University of Michigan, where he received the B. Sc. degree in chemistry in 1893. From October, 1893, to July, 1896, he was a fellow in chemistry at the University of Chicago, where he received the Ph. D. degree in July, 1896.

From August 1, 1896, to December 31, 1905, Dr. Hesse was research chemist with the Badische Anilin and Soda Fabrick, Ludwigshafan-am-Rhine, Germany, having particular charge of the chemical and technical side of all their patent and litigation matters in the United States, but taking a more or less active part in similar matters in other countries—Austria, France, Germany, Great Britain and Switzerland. This work necessitated an insight into the ramifications and details of co-ordination and of world and individual policy quite out of the ordinary.

From January 1, 1906, to December 31, 1915, Dr. Hesse was a consulting chemist in New York city. His principal public work was in connection with the Federal Food and Drugs Act in devising a system of control of coal-tar dyes in food coloring. This was the first workable, enforceable and satisfactory mode of governmental control devised in this particular field, in spite of numerous efforts on the part of many governments. It is now in force in all the States and territories of the Union but two, and was adopted by Canada also. Dr. Hesse is the author of Bulletin 147 of the Bureau of Chemistry, entitled "Coal-Tar Colors Used in Food Products." (226 pp.)

In 1907 Dr. Hesse initiated the production of liquid chlorine in this country, an article used prior to that time in limited amount, and all imported from Euorpe. This country is now absolutely independent of Europe as regards liquid chlorine and its consumption has increased many times.

From 1910-1913 Dr. Hesse was secretary of the Eighth International Congress of Applied Chemistry, held in Washington and New York, September 4-13, 1912.

From January 1, 1916, to date, Dr. Hesse has been a consulting member of the research staff of the General Chemical Company, of New York city. Since the outbreak of the war he has written and lectured much on the interrelation of the many phases of the coal-tar dye industry and their relation to other industries in the country. His writings caused the compilation of the "Dyestuffs Census" recently issued. He was chairman of the special committee of the New York section of the American Chemical Society which reported suggested tariff changes if this country decides it must have a coal-tar dye industry of its own, suggestions which ultimately led to an increase in the tariff on dyes and intermediates. He is, chairman of a special committee of the American Chemical Society aiming at improvement in the itemization of our imports of chemicals and dyes, and from 1913-1914 was chairman of the New York section, American Chemical Society.

Year.	Patented No.	Patented Per cent.	Not patented No.	Not patented Per cent.	Total for year.	Grand total.
1856	..	...	3	0.43	0.43	0.43
1858	..	...	1	0.54	0.54	0.97
1859	..	...	2	0.38	0.38	1.35
1861	..	...	1	1.58	1.58	2.93
1862	..	...	6	3.31	3.31	6.24
1863	..	...	3	0.33	0.33	6.57
1866	..	...	1	0.14	0.14	6.71
1867	..	...	2	1.27	1.27	7.98
1868	..	...	1	0.003	0.003	7.96
1869	1	1.26	..	...	1.26	9.24
1871	..	...	4	0.46	0.46	9.70
1874	..	...	2	0.23	0.23	9.93
1875	..	...	8	0.47	0.47	10.40
1876	2	1.24	4	0.87	2.11	12.35
1877	4	0.73	3	1.80	2.53	14.88
1878	7	1.03	4	1.53	2.56	17.44
1879	2	1.70	12	2.89	4.67	22.11
1880	..	...	6	1.63	1.63	23.74
1881	6	1.11	1	0.02	1.13	24.87
1882	7	1.44	6	0.14	1.56	26.43
1883	9	4.61	7	1.23	5.84	32.27
1884	5	3.83	1	0.07	3.90	36.17
1885	8	1.55	3	0.23	1.78	37.95
1886	6	0.37	12	1.78	2.15	40.10
1887	8	2.97	7	0.07	3.04	43.14
1888	16	2.17	6	0.05	2.22	45.36
1889	10	2.51	11	1.06	3.57	48.93
1890	9	0.67	13	1.91	2.68	51.61
1891	11	2.51	11	3.94	5.45	57.06
1892	8	0.55	12	2.23	2.78	59.84
1893	18	2.76	16	1.88	4.64	64.48
1894	8	0.30	14	0.32	0.62	65.10
1895	6	0.44	6	0.55	0.99	66.09
1896	9	2.26	7	0.38	2.64	68.73
1897	6	0.40	5	0.70	1.10	69.83
1898	5	0.12	5	0.09	0.21	70.04
1899	10	3.59	3	0.39	3.98	74.02
1900	6	1.67	3	0.45	2.12	76.14
1901	9	3.55	1	0.07	3.62	79.76
1902	12	2.39	8	2.58	4.97	84.73
1903	5	4.00	1	...	4.00	88.73
1904	5	1.05	4	1.14	2.19	90.98
1905	5	0.23	2	0.04	0.27	91.25
1906	9	0.84	2	0.11	0.95	92.20
1907	13	0.41	1	0.04	0.45	92.65
1908	9	1.02	6	0.22	1.24	93.89
1909	7	0.55	7	0.48	1.03	94.92
1910	7	2.06	2	0.08	2.14	97.06
1911	2	0.04	4	0.17	0.21	97.27
1912	1	0.18	..	...	0.18	99.45
—	..	...	12	...	2.27	99.72

CHANGES IN THE SOURCES OF SUPPLY OF CRUDE DRUGS—WHAT OF THE FUTURE?

BY CHARLES L. HUISKING.

FROM various sections we hear of efforts being made to grow crude drugs not previously produced in such sections, and while considerable progress has been made, the continued high prices are indicative of the fact that the former sources are not to be replaced successfully, at least not without considerable delay, and it is quite natural that this should be so, as production dependent entirely upon nature must necessarily be governed by nature's own actions and peculiarities.

Certain sections of Europe now cut and blown up by warfare formerly contributed heavily to the supply of crude drugs, and it is reasonable to assume that for a long time after the cessation of hostilities the natural advantages of the producing properties of such land cannot be made to perform their regular functions.

Then, too, labor is sure to have a very material effect on the question of crude drug prices of the future. This work in the past was looked upon as menial and was largely performed by peasants, whole families in some localities receiving only a few cents a day for digging or gathering a good amount of roots or herbs, but even before the war there was a tendency to neglect that trade for more remunerative work and from now on the tendency is bound to be even stronger. Labor will surely be much higher, due to scarcity, and to provide an assured future supply of crude drugs in those sections now neglected, the governments will probably take charge of the matter to see that proper attention is given to its redevelopment.

While certain drugs are indigenous to certain sections, due to climatic and soil conditions, there is no question but what other sections of the world could be made to produce a great many of them were the proper attention given thereto. For instance, in the last two years particularly, considerable success has been attained in growing crude drugs in sections never producing such commodities before. Even the United States has successfully produced in quantity and quality some important articles never before grown in this country. This has been made possible by the high prices procurable, and while present prices are not likely to be maintained when world's commerce is again established, it is also not likely that prices will ever get back to their former levels, so that the permanency of these achievements seems to be assured.

The one factor, however, that must be borne in mind is that the question of labor, after all, will affect nearly as much as anything else the crude drug situation of the future. It will probably develop when the countries abroad begin to take inventory of goods on hand that stocks of crude drugs are at low ebb and, unlike manufactured products, they cannot readily be replenished; at least, it will take some time to do so.

In a general way it can safely be predicted that crude drugs will take longer to gain their equilibrium after the war than any other branch of the drug or chemical line.

It might be interesting to note here the progress that has been made in directions other than former recognized sources of supply.

For instance, in our own country, we have, as stated above, made some remarkable progress; using, for example, the article cannabis. Efforts have been made for years to grow a drug that would compare favorably with the true Indian cannabis indica, and while it was found to be possible to grow cannabis in this country, it seemed impossible to produce it in quality and action equal to the true Indian, but now there is produced in Carolina a cannabis that answers the full description and requirements of

CHARLES L. HUISKING.

the U. S. P. and it is being produced in quantities sufficient to supply our home demand.

Then, too, belladonna, both leaves and root, have been produced successfully in this country in fairly good quantities.

Digitalis leaves are commanding considerable attention on the Pacific coast at the present time, but this industry has not developed sufficiently to determine its exact value.

In foreign countries, the most interesting developments have been made in Holland, in which country they have been able to grow drugs formerly limited to Austria and Germany; at least, they have demonstrated their ability to produce such goods, but the industry is still in its infancy, as they have not yet been able to see the result of more than one season's output. In England, or rather in Ireland, attention is being given at present to couch grass, and while experiments have also been made with the article in this country, better success has been attained in Ireland, but there is not being enough produced there as yet to supply other than the English demand.

The items just mentioned and many others are, therefore, the object of much interest, and the higher standard that is sure to prevail in the crude drug markets of the future will undoubtedly furnish the impetus for further and greater developments.

ECONOMICS OF THE DYESTUFF SITUATION — SHALL AMERICAN DYESTUFFS TAKE AN IMPREGNABLE POSITION IN THE WORLD'S MARKETS? HOW CAN THE NATION BEST FOSTER THIS WAR-BORN INDUSTRY?

By THOMAS H. NORTON, Ph.D., Sc.D.

NUMEROUS problems in American industrial evolution have been evoked by the present world conflict.

None have equaled in actual importance and in general interest those connected with the creation upon American soil of a comprehensive, self-contained, national coal-tar chemical industry.

Directly and indirectly a vast number of organized forms of productive industry, as well as numerous categories of final consumers, are dependent upon a regular supply of the derivatives of coal-tar—colors, explosives, medicinals, photographic chemicals, synthetic flavors and perfumes.

Prior to 1915 they relied almost entirely upon supplies from European sources, chiefly from Germany.

The experience of the past two years shows how seriously the whole fabric of American economic life is affected by any prolonged dependence upon distant sources, subject to more or less complete interruptions during wartime conditions across the Atlantic.

In the case of artificial dyestuffs, two problems have been faced.

First.—How can we temporarily meet the most pressing of the legitimate demands of the great industries primarily dependent upon chromatic effects—the textile, paper, leather, paint, varnish, ink, fur, feather, straw and similar branches?

Second.—How can we establish definitely and permanently in this country a fairly complete synthetic color industry, able to meet the great bulk of the American demand for such products adequately and satisfactorily?

The first and more urgent problem has been solved in a manner creditable to American enterprise, adaptation, ingenuity and technical skill.

The second is in the course of solution, with a fair promise of success; but it involves a far more exact diagnosis and a much closer application of economic laws than has been possible during the past months, in swiftly averting the threatened dangers of a dyestuff famine.

In connection with the first problem, a few statistics tell the tale.

Dyestuff Industry at Beginning of War.

When the great world conflict broke out, August 1, 1914, the status of the artificial dyestuff industry in this country was as follows:—Six factories, employing at the utmost 400 operatives, were manufacturing coal-tar colors to the extent of 3,300 short tons annually.

The production was based almost entirely upon the "assembling" of intermediates, chiefly of German origin. Nine-tenths of the labor represented in a ton of "American-made" colors, in 1913, had been performed on the banks of the Rhine or the Main or the Spree.

Imports from Europe amounted to 25,700 short tons annually. Of this quantity German manufacturers contributed 22,000 tons. The total annual consumption of synthetic colors in the United States was about 29,000 short tons.

Today more than thirty American dyestuff works are producing about 27,000 tons of staple synthetic colors, and every pound is derived from American coal tar. Single establishments employ over 1,000 operatives. The largest company represents an investment of $10,000,000.

Before the advent of this deplorable war our annual domestic production of aniline, the most important intermediate, was 800 tons. We imported 2,500 tons. Today we are manufacturing this compound at the rate of over 20,000 tons. Much is employed in our rubber works, much also in our explosive factories. A large amount is used in the direct dyeing of aniline black upon cottons— a substitute for sulphur black. The bulk of the output serves for the production of various standard dyes. Their number at present is limited, probably not over 100.

While this tour de force was being accomplished, other means were employed to lessen the pinch of the "famine." The leaders of fashion advocated the extended use of white apparel, or simple effects in either white or black, or with a minimum use of the brighter tints. Simultaneously, the American manufacturers of natural dyestuffs augmented their output upon an enormous scale, and dyers retufned to the old-fashioned methods employed by our grandmothers, and even now in vogue for the choice products of Oriental looms.

Here and there cases of actual hardship were inevitable, production being arrested to a greater or lesser extent by the total lack of tinctorial material —of slight relative value (often constituting but 1 to 2 per cent. of the worth of the finished product), but still indispensable.

The price of colors naturally fluctuated within broad limits, following the customary experience under such abnormal conditions, and obeying the laws of supply and demand.

In general, however, the output of textiles, etc., was not materially affected. Domestic demands were met tolerably well, and the export of textiles, leather wares and similar products, assumed dimensions hitherto unknown.

The artificial colors actually produced now are few, but sufficiently ample in number, so that by skillful blending the great mass of dyers' needs are met fairly well.

So much for the status of the domestic production, suddenly called into existence to meet a most pressing emergency.

What Are the Factors in Creating a Permanent Industry?

What are the factors entering into the question of a permanent, self-contained, American coal-tar industry? The first consideration is necessity. Do we actually need the industry? Argument in this connection is now superfluous. With singular unanimity, producers and consumers of colors in the United States have demanded from the nation's legislature such statutory enactment as may effectually safeguard the young industry, especially during its initial years, from all dangers of external competition, based upon either marked differences in cost of production, or the unfair use of accumulated capital and experience, as well as elaborate merchandizing organization, on the part of foreign rivals, to stifle and throttle in its infancy, the newly-created branch.

Granted then, a practically universal demand that the nation shall have its own synthetic dye industry, under what conditions can it be evolved, so that it may be able, at the earliest possible moment, to meet the bulk of the domestic demands for its products, with a minimum cost of production and a constantly diminishing dependence upon artificial protection against normal competition from abroad, and furthermore, so that it may be in a position, in the very early future, to sally forth into the markets of the world as effectively and triumphantly, as do the American producers of iron and steel, of locomotives and typewriters, of scores of other wares representing our skill, ingenuity and technical superiority?

Recognizing then that there is a fixed determination to have our own coal-tar color industry, we can enumerate the various factors which seem essential, with our present knowledge, for assuring a maximum degree of success.

The Controlling Factors.

These controlling factors fall into four categories:—

1. Action of government agencies.
2. Measures taken by producers of colors.
3. Measures taken by manufacturers of materials, of equipment and of accessories required for the production of artificial colors; and
4. Attitude, policy and action of the American consumers of coal-tar dyes.

1—Governmental Action.

The attitude of the executive and legislative branches of the national government reveals an intelligent, sympathetic interest in the problems involved, and a resolute determination to lend all possible aid in their solution.

A few examples may be cited:—

The Bureau of Foreign and Domestic Commerce in the Department of Commerce published in March, 1915, its exhaustive study of the dyestuff situation in the United States, outlining all factors in the case. In May it warned all industries concerned of the impending dangers. Since then it has done all in its power to inform consumers of colors how they can most easily lessen the hardships incident to a shortage in dyes. It has inculcated economy in the use of dyestuffs generally. It has pointed out the desirability of employing natural coloring materials on the most generous scale. It has encouraged and stimulated every undertaking promising to add even the smallest amount to the available supply of dyes. It has done all in its power to prevail upon capital and enterprise to enter the field of coal-tar chemistry, to increase the supply of coal-tar "crudes," to multiply the production of intermediates, to broaden and intensify the output of American-made, finished dyestuffs. It has brought together inventors and capitalists, the producer of colors and the consumer of colors.

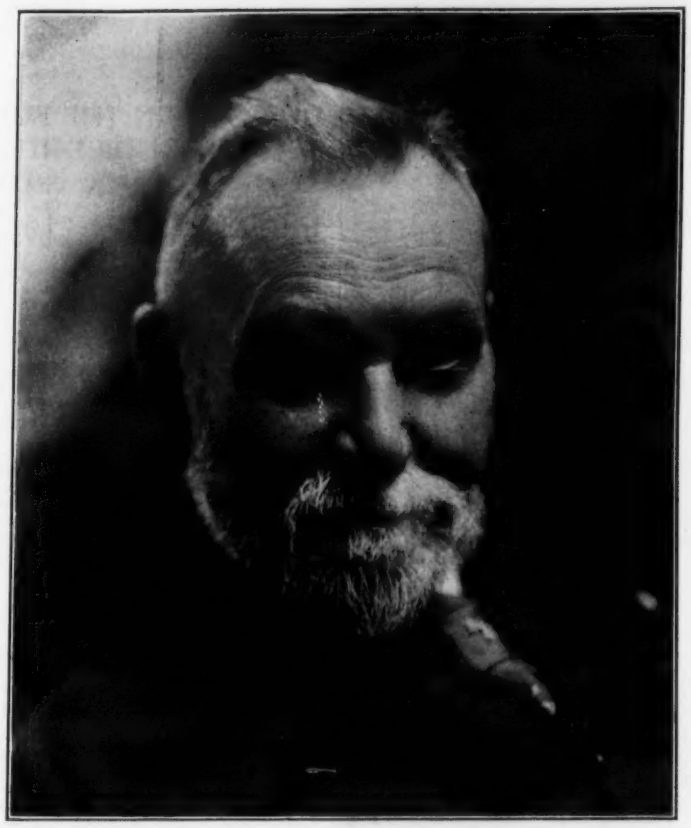
It has recognized the fact that all industries dependent upon the factor of color must suffer more or less from existing conditions, and has urged a mutual spirit of conciliation and compromise between the consumers of colored fabrics and articles, and the manufacturers of these wares.

In January, 1916, it published a comprehensive report portraying all of the factors in the "Dyestuffs Situation," a second edition of which was required in May, 1916.

In November, 1916, it issued a voluminous "Census of Dyestuffs," depicting in the fullest detail the quantities and values of the several thousand artificial colors imported into this country during the last fiscal year preceding the current war. A full portrayal of the status during the year in question of the modest American dyestuff industry was included. The volume was compiled at the earnest request of those engaged in creating the new industry. In their opinion it is essential that the organizers of a national color industry know how much annually is consumed of each primary

DR. THOMAS H. NORTON.

Special Agent of the Department of Commerce and Author of the "Census of Dyestuffs Used in the United States," and Many Other Monographs.



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Thomas H. Norton, special agent of the Bureau of Foreign and Domestic Commerce, at Washington, and author of the complete census of artificial colors used in this country, just issued from the government press, under the title "Artificial Dyestuffs Used in the United States," is an investigator of unusual experience and an author of repute on chemical and industrial topics. He has published a great number of papers containing the results o fhis researches in mineral, organic and technical chemistry. Among the books from his pen are:—"The Application of Aniline Colors to the Dyeing of Leather," 1877; "Chemical Exhibits of the Paris International Exposition of 1878"; "The Utilization of Atmospheric Nitrogen," 1913, regularly used as a textbook both here and abroad; "The Chemical Industries of Belgium, Holland, Norway and Sweden," 1913, translated into German; "Dyestuffs for American Chemical and Other Industries," 1915; "Cottonseed Industry in Foreign Countries," 1915; "The Dyestuff Situation," 1915; "Potash Production in California," 1915; "Potash from Kelp," 1915; "The Dyestuff Situation," January, 1916—second edition, May, 1916.

Dr. Norton was born in Rushford, N. Y., June 30, 1851, and was graduated at Hamilton College in 1873 as valedictorian, and first prize man in classics, mathematics, chemistry and physics. He studied at the University of Heidelberg under Bunsen and Kirchoff in 1873-1875, and won his Ph. D. there. He was a student at the University of Berlin in 1876-1877 with August Von Hofmann, in whose laboratory the first aniline color was discovered, and was a student at the University of Paris in 1877-1878. During these years he made journeys on foot of more than 12,000 miles in Europe and Western Asia, and was the first to traverse Greece, Palestine and Syria on foot alone.

For five years, from 1878 o 1883, he was manager of the chemical works of the Compagnie Generale des Cyanures of St. Denis, near Paris, manufacturing dyeing materials. Returning to this country he was for 17 years professor of chemistry at the University of Cincinnati, 1883-1900. In the latter year he was appointed by President McKinley to establish an American consulate at Harput, Eastern Turkey. During 1904 Dr. Norton engaged in a special investigation of the Armenian situation, and in the winter of 1904-1905 he was sent on a diplomatic mission to Persia by President Roosevelt. In 1905-1906 he was American consul at Smyrna, and from 1906 to 1914 American consul at Chemitz, Saxony. Here he was largely occupied with textile problems in connection with the application of colors to fabrics. In 1911-1912 he was detailed on special service for the Department of Commerce to study the chemical industries of Europe. The results of his investigations are found among the special monographs already mentioned.

Since 1914, under the direct auspices of the Bureau of Foreign and Domestic Commerce, Dr. Norton has been occupied with the problems connected with the effective utilization of the opportunities afforded by the European war to build up a complete cycle of chemical industries in the United States.

Dr. Norton is a fellow of the Chemical Society, London, and of the American Association for the Advancement of Science. He is a member of the Society of Chemical Industry, London; Deutsche Chemische Gesellschaft, Berlin; Societe Chimique de France, Russian Chemical Society, Petrograd—for many years its only foreign member—and the American Chemical Society. In 1896 he received from Hamilton College the honorary degree of Sc. D. He was made a member of the American Academy of Social and Political Science in 1915 and of the National Institute of Social Sciences in 1916. He was a delegate to the second Pan-American Scientific Congress in December, 1915, and his monograph on "Tanning Materials from Latin America," read before that body, is now in the press. In addition he is a member of the Cosmos Club and the Commerce Club of Washington and the Chemists' Club and Delta Kappa Epsilon Club of this city. His home is in New Haven, Conn.

dye, and how much of each minor modification is employed. Without such data the prospective manufacturer is at a loss to calculate the size and number of the units to be constructed for the production of any given dye. He is at an equal loss as to the equipment necessary to manufacture it in the different modifications of current use.

It was felt that any intelligent effort to build up a comprehensive, self-contained American coal-tar industry must rest upon the solid foundations of accurate, statistical data concerning the American market for artificial colors. In no other way can the creators of such an industry avoid duplication, overlapping, waste and blundering, tentative struggles, to adjust productive mechanism to a vague, indefinite demand. Without such fundamental data the future industry will be heavily handicapped by permanent overhead charges, accumulated as a result of being forced to feel its way in the dark, chemically, mechanically, commercially.

Activities of Government Bureaus.

In the autumn of 1915, the chief of the Bureau and the Secretary of Commerce defined fully the attitude of the Department, in its conviction that adequate legislation was urgently needed to protect those embarking in a comprehensive coal-tar dyestuff industry, against the danger of "dumping," and determined underselling, on the part of the foreign competitors, hitherto dominating this branch.

The Bureau of Standards in the same department has secured adequate appropriations for the current fiscal year and prospectively for that of 1917-1918, to carry on its researches regarding the standardization of colors.

The Bureau of Chemistry in the Department of Agriculture is now engaged upon elaborate investigations, under an apropriation of $50,000, aiming to solve some of the pressing problems faced by the new industry.

Fine work has been done by the Forest Service, of the same department, in introducing at an opportune moment, the new American yellow vegetable dyestuff obtained from the osage orange, of material and permanent value in easing the general situation.

So much for the activities of the different government bureaus.

The most important aid, however, was rendered by Congress, when on September 8, 1916, it passed a tariff act, placing upon all coal-tar derivatives—not merely synthetic colors—a series of duties combining both specific and ad valorem rates, affording fairly adequate fiscal protection to all products of a complete, self-contained, national coal-tar industry.

This statutory enactment was supplemented by an act making as impossible in foreign trade, as it is now in domestic trade, any attempt to crush, stifle and throttle a new industry, on the part of competing rivals beyond the seas.

We are thus assured of adequate protection against unfair competition on the part of foreign manufacturers of coal-tar products when normal international exchanges are re-established.

2.—Action of Producers of Colors.

The most important questions connected with the healthful evolution of an American color industry, arise from the somewhat rapid entrance into this field of a number of separate interests, imperfectly acquainted with the complexity of the problem.

It is well known to every one who has studied the fundamental basis of the past dominance of German color chemistry in the world's markets, that the chief cause of this marvelous control lies in the solidarity of the German industry as a whole. It is so organized that all the correlated parts act in unison. They form practically a unit when, in any land, a serious effort is exerted to secure freedom from dependence upon foreign sources of color.

The question now arises:—Is it not eminently desirable that a comprehensive American coal-tar industry, striving to supply nearly all American tinctorial needs, with products made from American raw materials, should possess a higher degree of unity—financial, technical, commercial—than now is the case? Is it not of prime importance that all unnecessary overlapping and duplicating of effort be excluded, at least in the formative stage?

The problem is more easily stated than solved. It is economically important during the initial period that the industry should be characterized by that unity and solidarity which contribute so largely to the might and effectiveness of the German rival; and yet it must be free from any tendency toward monopolistic power.

Two distinct phases of action are here indicated.

In the first place, it would seem to be most desirable that the industry should posses its distinct trade organization, aiming to advance the collective interests as effectively as is done by the many other associations, representative of American industrial effort.

Such an organization could advantageously include the manufacturers of both artificial and natural colors, the manufacturers of coal-tar crudes and intermediates, those creating the allied coal-tar branches, producing synthetic flavors and perfumes, medicinals, photographic chemicals, etc., and the few firms specializing in the mechanical equipment required in the manufacture of the various coal-tar and organic coloring matters.

* * *

An association of this character should logically have its organ, one free from all affiliations with elements antagonistic to the evolution of the comprehensive, self-contained, American coal-tar industry, and the healthful expansion of our American production of natural dyestuffs.

There is a very distinct field for such an organ. Over $100,000,000 has been invested in the new industry during the past eighteen months. The scores of manufacturers of coal-tar crudes, intermediates and finished dyestuffs, as well as of vegetable dyes, the hundreds of dealers, the thousands of consumers in the textile, paper, ink, fur, feather, varnish and pigment branches, require an organ in which their combined interests will be fully furthered and defended.

A journal managed and edited with such breadth of view, literary, artistic and typographic perfection and general devotion to the vital interests of American producers and consumers of colors, as is found in some of our leading trade periodicals, would command at once a large constituency and exert a powerful influence upon public sentiment and legislation.

What Association Can Accomplish.

What such an association might accomplish for its members has been recently outlined, very happily, by the dean of American chemists, Prof. C. F. Chandler, of Columbia University, as follows:—

1. It can establish a friendly union for mutual advantage.

2. It can open a headquarters at a convenient point, to which all the members of the association may have free access.

3. It can maintain at this headquarters:—

(a) A directory of manufacturers;

b) A directory of the raw materials required by each;

c) A directory of the products which each is prepared to furnish;

(d) It can maintain a comprehensive exhibit of everything connected with the color trade:—

(1) A museum of raw materials;

(2) A museum of finished products;

(3) Samples of all colors on the market, with names of the manufacturing firms.

(e) It can maintain a complete library containing all publications on the manufacture and uses of dyes.

(f) A collection of all patents for the manufacture of dyes and coal-tar intermediates can be kept up to date.

4. It can create an information bureau, furnishing to any member all available data on any particular color, its manufacture and uses.

5. It could maintain an employment bureau for the mutual benefit of trained chemists and of employers.

6. It could maintain a research laboratory.

7. It can keep a record, as far as possible, of the statistics of importation, sale and manufacture of each one of the various dyes.

From another source comes the following summary of the different objects of such an organization:—

Other Things It Could Accomplish.

1. Specific legislation for the coal-tar industry.

2. Close co-operation among the members of the association; consideration of consolidation or expansion, if by so doing greater efficiency could be brought about and the industry be more economically administered.

3. Activity in the entire field of research affecting this industry.

4. The interchange among members of by-products in the manufacture of any given intermediate or dye.

5. The training of operating chemists and others for the industry.

6. The standardization, nomenclature and identification of colors, using types made by various manufacturers in other countries.

7. The standardization of the strength of colors, or the value of "salting" colors.

8. The development of a selling organization for the sale of the products of the members:—

(a) Handling by brokers.

(b) Investigation and development of foreign markets.

(c) The sale of products for export.

9. Credits.

10. Establishment of a bureau for the compilation of data and information regarding sources of supplies, of crude and intermediate materials, for the members of the association, which may be used as a Purchasing Department for joint or individual purchases.

11. As almost all of the plants engaged in the manufacture of intermediates and dyes would be available for the manufacture of explosives, in one form or another, within a very short time, the development of the industry should be in some way co-ordinated with the War Department in Washington.

12. Practical counsels to prospective manufacturers, who, through lack of sufficient financial strength, knowledge of the subject, or of ability to manufacture, would not be liable to succeed.

13. The object of the association should be to benefit the legitimate, permanent manufacturer of dyes and intermediates, and is not intended to aid speculators, brokers, stock-jobbers or "get-rich-quick" dreamers.

In the second place the possibilities of more or less organic union between the many scattered industrial units deserve the most careful attention.

A business combination, within the limitations of the Sherman act and the Clayton anti-trust law might effect marvels in placing our young industry promptly on terms of economic equality with the giant coal-tar industry in Germany.

The recent consolidation of interests among the powerful companies constituting the German industry, indicates the fierce contest which our American manufacturers must face in the early future. It does more. It points out the most effective armor of defense.

A similar "pooling" of interests may be our salvation. A well thought-out policy, safeguarding the future of the smaller undertakings, providing economically, but generously, for the harmonious expression of all factors, great and small, along the lines of least resistance, with a maximum of united and individual efficiency, and a minimum of general cost of production, will enable us to victoriously overcome all obstacles, technical and commercial.

The multitude of economies, which may be effected, scarcely need enumeration. Among those are collective purchasing and selling agencies, a central research laboratory, the advantageous inter-exchange of by-products and semi-manufactured material, united action in entering foreign markets, etc.

Field of Standardization.

Probably the greatest accomplishment to be expected from such consolidation, or from even a simple association of allied interests, lies in the field of standardization. There is no question but that a marvelous element of strength to a growing domestic color industry would result from the establishment of a bureau of standards for dyestuffs, possibly by combined action with the great textile and allied organizations of the country. Such a bureau would be modeled after the admirable division of chemistry in the well-organized Bureau of Standards of the Department of Commerce. Its function would be to formulate the physical and chemical criteria of purity for all dyestuffs, exactly as is now done for the drugs listed in our Pharmacopoeia. In the laboratories of such a bureau—they would necessarily be vast—it would be as easy and simple to check and control the tinctorial values of dyestuffs, as is now the case for our medicinals.

Such principles of standardization could likewise profitably be extended to the various methods of application of colors to the different fibers and on other wares. A single, finely equipped bureau could advantageously replace the multitude of laboratories now maintained by rival dyestuff firms, or in textile and similar works. Such an institution could effectively protect a half-grown American industry against attempts to depreciate the quality and value of American-made dyes, and could insure a far greater degree of economy in cost of production than otherwise would be possible.

Everyone familiar at all with the employment of colors in dyeing can easily picture to himself the enormous advantages resulting from the impartial and exact classification and standardization of all coloring materials encountered in commerce, or the simplification, economy and certainty attendant upon their use in connection with the different fibers and fabrics, as well as with leather, feathers, ink, varnish, paper, etc.

Instead of hundreds and thousands of isolated, blundering attempts to obtain the best dye for securing certain color results, the desired data could be requested by return mail from a national laboratory. If a dyer wishes to know exactly under what conditions, and in what quantities, a given dye should be employed to produce certain tinctorial effects upon a specific fiber with a minimum expenditure of color, the full directions could be obtained, free of cost, with but little loss of time.

Such standardization can naturally be extended to the fullest extent, to both methods and products, in the manufacture of intermediates, and in the production of coal-tar compounds outside the category of dyestuffs.

The principle should be carried out to its logical conclusion in the standardization of the all-important types of apparatus required in the production of both intermediates and finished coal-tar products. Admirable work in this field has already been done by the leading companies engaged in the manufacture of machinery and accessories employed in the new industry.

In this connection the matter of a more or less close co-operation with the powerful organizations formed in other countries, aiming likewise at the creation of self-contained, national color industries, deserves the most careful attention. Great Britain, France, Italy, Japan and Russia are each striving, as we are, towards complete emancipation from dependence upon foreign sources of artificial colors.

III—Action of Manufacturers of Intermediates.

The conditions of the problem plainly render it advisable, in the highest degree, for all business enterprise, occupied in these fields, to co-operate as closely as possible with those engaged in the production of finished coal-tar compounds. This may be done by consultation, or still better, by union in formal association, as already outlined. **The essential is to keep constantly in view the co-ordination, co-operation and solidarity of interests, so absolutely indispensable in making this new industry, in all its ramifications, a permanent asset of the country's economic wealth.**

IV. — Attitude, Policy and Activity of Consumers.

The consumers of synthetic dyes number many thousands, scattered amongst scores of industries.

Have they a definite role to play in assuring the future of the industry?

Assuredly there is little question but that the complete standardization of existing dyestuffs, and of all additions to their numbers, as well as of the methods by which they can be most effectively and advantageously employed, should be a prelude to a vastly simpler and more economical method of merchandising than is now the rule.

It would not be a difficult matter to organize into a compact body the consumers of colors of all forms. Such a corporation would have for its object the purchase in quantities, at the lowest wholesale rates, of all required dyes and the distribution of such wares at cost price to the individual members. The actual expense to each member of such an organization would be almost negligible. Constituent members would be free to buy any dyes in current use. The only restriction would be the absolute requirement that all purchases of colors should be made through a central agency, or one of its branches. Such an agency would be backed up by the National Bureau of Dyestuff Standards in all current questions regarding purity, ease of application, etc. It would insure the delivery to members of dyestuffs of standardized strength and purity at wholesale rates.

Consumers of colors would thus be freed to a large extent from all uncertainty and anxiety regarding the price and character of their dyes. Further, a powerful weapon is put into the hands of those who collectively represent such consumers to rule out rigidly from the sources of supply, any manufacturer, foreign or domestic, who would deliberately make an attempt to undersell his American rivals, or who would resort to any other unfair restriction of trade. Such an organization would be one of the most powerful bulwarks to ward off the dangers of persistent and determined efforts on the part of the European rivals, to crush and stifle an American dyestuff industry.

It is scarcely necessary to cite the instances in this and other lands, where collective purchasing and collective selling have been the leading elements in placing important industries upon a sure foundation, and lowering materially the cost of their products to the final consumers. The present policy of the German color combine is essentially of this nature.

Possible Swiss Co-Operation.

There is probably one factor lacking to bring rapidly into existence a comprehensive American coal-tar dyestuff industry. That is the co-operation of a few men possessing highly developed capacity for organization, combined with a perfect experimental command of the exceedingly complex and intricate field of color chemistry in all its ramifications—men such as created in the past the great works on or near the Rhine, or those now directing them. It might be possible to secure such needed co-operation from the large and well-equipped staffs of the four color works at Basel, in Switzerland.

These highly specialized groups include scores of men of broad experience in the manufacture of the whole range of coal-tar dyes. Most of them have enjoyed in earlier days the advantages of the "Polytechnic" of Zurich, one of the best equipped institutions in Europe, for the training of color chemists. Many have served a more or less extensive apprenticeship in the gigantic German chemical works.

It is not difficult to imagine a union of forces in this field—a consolidation

of interests between the Swiss companies and the American firms now striving to expand, but forced, as it were, to grope in the dark at times. The transfer of a sufficient corps of expert Swiss color chemists to the United States, at this critical moment, would be of untold value in furthering the rapid evolution of the American industry.

It would be possible, by their aid and direction, to attain, as regards time and money, the maximum of economy in constructing new plants, in adopting the most practical and effective mechanical devices, in applying the most economical methods, in coordinating the diversified features of a complicated branch of manufacture, so as to avoid loss of material and restrict the dependence upon highly skilled and expensive labor. At every step in the organization of a new plant and in the initial months of its operation, the directive co-operation of practiced experts would insure the establishment of a self-contained coal-tar chemical industry on American soil, with a minimum of outlay and a maximum of efficiency, in the shortest possible period of time. It would probably enable the industry, in its broader phases, to become so thoroughly rooted in the economic life of the country that, upon the return of normal international exchanges, legitimate competition of foreign rivals could be easily and effectually met.

A striking example of how the dyestuff problems of a great nation can be solved by the co-operation of Swiss intelligence and experience is now seen in Russia. The textile and allied interests of the Russian Empire formerly depended chiefly upon Germany for color materials. The largest dyestuff company of Germany conducted a branch factory in Russia prior to the war. Dependence upon Germany for semi-manufactured material and for finished dyes was quite as pronounced as in our own country or in Great Britain.

The sudden interruption in current supplies of dyes, consequent upon the outbreak of hostilities, was a heavy blow to Russian textile works. A way out has been found by the organization of a strong company, of which the leading dyestuff house of Basel is a constituent member. This latter furnishes an administrative and technical staff—in other words, the "brains" of the undertaking. Capital is supplied by a group of prominent Russian textile manufacturers, who at the same time are the chief consumers of the dyes produced.

The arrangement is eminently practical. As in the recent British organization, the consumers of dyestuffs are the owners and controllers of the undertaking, and a continued market for the output is assured. An abundant source of crude material is furnished by the Russian coke works.

What is done so easily in other countries to meet present emergencies and lay the foundation for a future national dyestuff industry, can serve admirably as an object lesson to the United States, ordinarily so much more prompt in recognizing and improving industrial opportunities.

The creation of a comprehensive manufacturing plant by an alliance between Swiss experience, enterprise and skill on one side, and the large financial resources under the control of our great textile interests on the other side, is a solution by no means difficult of realization. It would assure capital, management and market the three essential factors of success.

A less complex and perhaps more feasible method of accomplishing the end in view would be found in establishing a comparatively close organic connection between individual Swiss companies and individual American companies already engaged in the active manufacture of dyestuffs, but limited hitherto to a very narrow range of products.

Relations of Swiss Color Industry.

It is well to note in this connection the relations of the Swiss color industry to both the American and the international markets.

The average annual value of the Swiss exports of artificial colors to the United States during the five years ending June 30, 1914, was $815,911, as follows:—Alizarin and alizarin colors, $1,777; synthetic indigo, $48,904; other coal-tar colors, $765,230; total, $815,911.

In 1913-14, Switzerland supplied 7 per cent. of our imports of indigo and 10.6 per cent. of the imports of aniline dyes. The import of alizarin was insignificant. Since the outbreak of the war, and the resultant scarcity of artificial colors, the Swiss import has been of great assistance to American textile interests.

The normal production of the Swiss dyestuff works, available for export purposes, has an annual value of about $5,500,000. It is equivalent to nearly one-ninth of the German export, and could cover alone nearly 60 per cent. of the average annual imports of artificial colors into the United States.

Few realize the role which Switzerland has played in the evolution of the artificial dyestuff industry, despite the entire absence in the land of coal and of raw materials for the manufacture of chemicals, with the exception of salt. Immediately prior to the war, Switzerland on the basis of population, was supplying twice as much as Germany, relatively, to the world's market for synthetic colors.

Favoring Legislation.

Brief allusion has already been made to the recent legislation by Congress, contained in the general revenue bill of September 8, 1916, aiming more particularly to facilitate and hasten the establishment of a comprehensive, coal-tar chemical industry in the United States.

This legislation seeks on the one hand to prevent unfair competition, and on the other to counterbalance any difference in the cost of production between the European and the American industry, by the establishment of higher duties upon coal-tar products than have hitherto been in existence.

While this legislation is well-meaning, and even generous in many provisions, it is fairly open to criticism as lacking in clearness, certainty, logic and intelligent discrimination.

It would appear most desirable that in the framing of an act, intended to be, as it were, the Magna Charta of a new industry, legal and technical knowledge of the highest order should be utilized in order to eliminate vague and uncertain wording and approximate as closely as possible to the equities of a very complex and involved problem.

It is important that the phraseology should be such as to facilitate legal procedure, and that the various provisions should distribute equally the element of protection, so as to command the respect of all parties concerned, and to encourage impartially the establishment of all the varied features of the industry in question.

These canons of criticism may be applied to the act under consideration.

In section 801 the nature of transactions, involving the element of unfair competition, is defined fairly well. There follows, however, a proviso:—"Provided that such act or acts be done with the intent of destroying or injuring an industry in the United States, or of preventing the establishment of an industry in the United States, or of restraining or monopolizing any part of trade and commerce in such articles in the United States."

This introduction of the factor of intent opens the way to unlimited litigation and contenion, and may in practice, nullify the operation of the whole section. "Intent" is legitimately and wisely a subject of careful examination in connection with such a crime as homicide, in order to establish varying degrees of murder and manslaughter. In commercial matters it is almost impossible to establish, beyond reasonable doubt, the actual animus back of a given transaction.

It is felt that the following wording, drawn up in 1915, submitted to the Federal Trade Commission and favored with its approval, places the legislation upon a much surer and clearer basis, dealing essentially with facts:—

"A—It shall be unlawful for any person, engaged in interstate or foreign commerce or industry, to sell or purchase articles of foreign origin or manufacture, in the sale of which in the country of origin, or elsewhere, discrimination as to prices is made between different purchasers, where the prices paid for such articles by the American user, consumer, or dealer, after deduction of all charges, incident to transportation, handling and entry, are materially below the current market rates for such articles in the country of production, or from which shipment is made to the United States, in case such prices substantially prevent competition on the part of American producers of similar or allied articles, or tend to create a monopoly in the sale of such articles in the American market.

"B—It shall be unlawful for any person engaged in interstate commerce or industry, to buy, sell, or contract for the sale of articles of foreign origin or manufacture, or fix a price charged therefor, or rebate upon such price, conditioned upon the purchaser thereof not using or dealing in wares produced or sold by competitors of the manufacturer or seller, where the effect may be to substantially lessen competition in the production in the United States of such articles, or tend to create a monopoly in the sale of such articles in American markets."

Turning to the sections establishing the rates of duty on coal-tar compounds, we encounter pronounced anomalies, and an entire lack of ability to break loose from the antiquated classification of coal-tar "intermediates" and finished compounds.

Three Divisions of Coal-Tar Compounds Under the Tariff.

Three categories of coal-tar compounds are established for tariff purposes.

Class I includes all crudes, except phenol, the cresols and naphthalene in refined forms. No duty is imposed upon members of this class.

Class II includes the exceptions to Class I and all intermediates. The members of this class pay 15 per cent. ad valorem and 2½ cents per pound.

Class III includes all finished coal-tar products. The rate of duty is 30 per cent. In addition a specific duty of 5 cents per pound is laid upon members of the class, exception being made for medicinals, flavors, alizarin, indigo, indigoids, and all dyes made from alizarin, indigo, anthracene and carbazol. These latter enjoy simply the ad valorem rate.

This classification is open to the following criticisms:—

There is no manifest reason for distinguishing between low-grade and high-grade phenol, naphthalene, etc. The operations of refining are relatively simple and essentially mechanical. There is no material difference in the cost of production between European and American wares.

There is no valid reason for imposing a duty of 5 cents per pound on certain dyestuffs and remitting it in the case of others (indigo, alizarin, etc.), and coal-tar derivatives destined for other than tinctorial uses. Each category has a logical right to the same measure of protection.

Finally, there is absolutely no reason for discriminating, in regard to tariff rates between coal-tar compounds, on the basis of final utilization, one category serving to make more complex derivatives, the other destined for direct use in the arts.

There are many scores of so-called finished products which require far less actual labor or costly supervision than is the case with numerous intermediates. Again we encounter quite a class of compounds, employed sometimes as finished products, for use in dyeing or medicine and sometimes as intermediates in the manufacture of more complicated substances. Aniline and salicylic acid fall within this dual classification.

No attempt has been made hitherto to frame a tariff schedule for coal-tar compounds, based upon scientific principles, recognizing the fact that the claims for artificial protection should increase, pari passu, with complexity of manufacture.

The following considerations lay at the basis of any such attempt:—

Factors in Artificial Dyestuffs Industry.

I. In the case of the artificial dyestuff industry, and of most chemical industries, differences in the items composing the cost of production are not very material, except in the matter of salaries. Raw materials cost practically the same on both sides of the Atlantic. The prices for most of the chemicals, so abundantly needed, are essentially the same. Equipment costs the same. Overhead charges should be the same.

II. In the matter of labor, the difference is not very pronounced between current German wages and wages in the United States. Dr. B. C. Hesse, the well-known chemist and statistician, estimates that in 1908 the average daily wage paid in the German dyestuff industry to adult men, skilled and unskilled, was $1.40. To this he adds 44 cents to cover the outlay by employers for general welfare, insurance against old age, sickness and accident, as well as divers bonuses. The total makes $1.84 per day or, on a basis of 300 working days in the year, $552 annually.

In the year 1909, according to the Census Report, the average general wage in the dyestuff and extract branch in the United States was $523. Adult males composed 98 per cent. of the wage earners. In 1914, according to the Census Report, the average annual wage in the coal-tar dyestuff industry in the United States was $628.

In Germany, wages increased 77 per cent. from 1886 to 1908. There has been a steady increase since 1908. It may fairly be assumed that the current cost of the labor used in Germany for the manufacture of artificial dyestuffs, including outlays by employers for but little, if at all, inferior to the rates prevalent in the United States during 1914.

It is furthermore to be considered that the item of labor enters into the cost of production of dyestuffs in Germany to the extent of but from 10 per cent. to 15 per cent. In the United States, it constitutes 7.1 per cent. Any actual difference in current rates of wages between the two countries counts, hence, but very little in the total cost of production of a given dyestuff—assuming equal efficiency on the part of workmen. There is some question whether the average workman in American color works is quite as skilled and efficient as the average German operative.

As to Salary Comparisons.

III. In the case of salaried officials and chemists, there is a more pronounced difference between the rates current in the two countries. No exact data can be given. In 1914 the American coal-tar dyestuff industry required the services of 130 salaried employes. Their salaries amounted to $273,000, and constituted 7.6 per cent. of the total value of products for the year. The average salary was $2,100. This figure is probably double what it would be in German dyestuff works. Other things being equal, this factor represents an advantage, in favor of the German producer, of about 3.8 per cent. in the cost of production.

IV. It is pertinent to consider, then, what constitutes the main source of the ability of German manufacturers of artificial dyestuffs to produce their wares at a lower cost than in most other countries. This ability results from the perfect organization of every phase of the manufacture, as conducted by each independent company, from the complete co-ordination of the different parts of each individual company, and from the close and intelligent co-operation between the various firms in the whole coal-tar industry.

This highly perfected co-ordination of intelligent effort and guidance makes itself felt pre-eminently at each step in the evolution of a dyestuff, dependent upon a distinct chemical transformation of the material undergoing manufacture. Thus, in the total cost of production of a dyestuff involving five well-defined chemical transformations of the original coal-tar crude—synthetic indigo, for example—it may be fairly estimated that there is five times as much advantage on the side of the experienced German manufacturer, as in the case of such a dyestuff as picric acid—manufactured from a coal-tar crude by a single reaction.

In establishing on American soil a self-contained coal-tar chemical industry, this handicap is felt at every step in a maximum degree during the initial years. It will necessarily decrease steadily with each passing month and year, as American ability and efficiency, scientific, technical and administrative, master the situation, and reduce the cost of production to the point at which we can easily meet foreign competition in the world's markets, as has been the case with so many of our industries, after fairly emerging from their swaddling clothes.

For the time being, it is an unquestioned fact that in building up such a complex and intricate industry on American soil, American enterprise is seriously handicapped at the outset.

V. A duty of 5 per centum ad valorem was placed in the so-called Hill bill of December, 1915, upon all the "crudes" separated from coal-tar and purified by chemical and mechanical treatment, to serve as the basis of a comprehensive coal-tar chemical industry. It is assumed that the handicap in question may fairly and approximately be gauged as equivalent in most cases to some such figure as the above, on the cost of production for each chemical transformation. Such a basic unit could be adopted as the fundamental feature of the accompanying schedules.

Coal Tar Chemical Industry to Be Treated as a Unit.

VI. All derivatives of these few "crudes"—only six are of pronounced importance—are brought within the provisions of a tariff act. Logically, technically, scientifically and economically, the entire coal-tar chemical industry must be treated as a unit. This is the case in Germany. In practically all of the few vast works dominating this branch in that empire, the same raw material is employed to produce dyes, medicinals, explosives, photographic chemicals, artificial perfumes, and sundry chemicals for varied minor purposes. If the American industry is to develop on a sound, economic basis, this fact should be recognized by all factors concerned, following the example of Germany, as well as of Switzerland, which contributes twice as large a volume of dyes to the world's markets in proportion to its population, as is the case in Germany.

VII. Adopting this fundamental principle, a schedule is formulated, in which each successive class represents an advance of one step in purely chemical treatment. Progressive additions of the basic unit in the ad valorem rate of duty could be attached to each successive class of products. The duty on the first class would be the basic unit; that on the second class would be double the unit; that on the third class would be treble the unit; that on the fourth class would be quadruple the unit, etc.

The first class (Class A) includes all "crudes" found in coal-tar.

The second class (Class B) includes all products made from coal-tar crudes by a single chemical reaction; such intermediates as nitrobenzene and phthalic acid; such explosives as picric acid and trinitro-toluene; and such dyestuffs as aurine.

Class C includes all products made from members of Class B, by a single reaction. It is much more numerous than Class B. Among the intermediates are aniline, benzoic acid, salicylic acid, beta-naphthol, etc. Among the dyes are coralline, galleine, Victoria yellow, quinoline blue and red, and fast black B. The photographic developers amidol and p-amidophenol, the artificial perfumes benzyl alcohol, and trinitrobutyl-toluene, and such medicinals as the salicylates are found in this group.

Class D includes all products made from members of Class C. It is very

large. Among the intermediates are benzidine, tolidine, diphenylamine, and a host of sulphonic acids. Among the dyestuffs are alizarin, fluorescein, nigrosine, Sudan brown, mauve, Vidal black and quinoline yellow. Explosives are represented by tetra-nitraniline and the stabilizer formanilide. In this group occur such artificial perfumes as methyl and ethyl salicylates, phenyl-propyl alcohol, methyl, ethyl and benzyl benzoates. Among the medicinals are acetanilide, aspirin and atoxyl. Photographic chemicals are represented by metol, ortol and glycin.

Class E includes all products made from members of Class D. Intermediates are fairly numerous and dyestuffs are strongly in evidence. In this group are also many sulphonic acids obtained from naphthalene derivatives. Among the intermediates are primuline base, paraphenylene-diamine, phenyl-glycine-carboxylic acid (used in making indigo) and methyl-diphenylamine. Leading dyestuffs are eosin, erythrosine, purpurine, induline, indanthrene, immedial black, magenta, Bismarck brown and Martius yellow. Perfumes are represented by methyl anthranilate; photographic developers by hydroquinone and reducin; sweet substances by saccharin and sucrol; medicinals by phenacetine, triphenine, phenocoll, acetylatoxyl and pyoktannin.

Class F includes all products made from members of Class E. The intermediates are fewer in number. Among them are numerous sulphonic acids of the naphthalene group, several dioxynaphthalenes, chloro-benzaldehyde and diamido-diphenyl-thiourea. Among the many dyes are indigo, malachite green, auramine, safranine, primuline, glacier blue and erythrine. Antipyrine and methyl-saccharin are among the medicinals; and adurol, diogen and eikonogen among the photographic developers.

Class G includes all compounds made from members of Class F. There are but four intermediates. A typical one is diethyl-dibenzyl-diamido-phenyl-methane-disulphonic acid. The class consists chiefly of dyestuffs such as Victoria blue, indazine, Clayton yellow, Atlas red, and chrysophenine. Salvarsan is found among the therapeutic agents.

Class H includes all compounds made from members of Class G. There are but three intermediates. Prominent among the dyes are tartrazine, oxamine violet, chrome blue, acid green and toluidine blue. Pyramidone is a medicinal.

Class I includes all remaining coal-tar derivatives. No intermediates are found in this class. Leading dyestuffs are methylene blue, methylene green, fast green and Janus red.

Assuming a basic rate of 5 per cent. ad valorem for Class A—coal-tar "crudes"—duties would rise automatically to 45 per cent. for the more complex compounds of the final group—Class I.

The location of the different coal-tar compounds in the successive classes could be definitely fixed by the Treasury Department, and changes could be made annually, in accordance with current modifications in processes of manufacture.

The reactions serving to locate various coal-tar derivatives in the foregoing series of classes are such as to produce a profound change in the chemical composition of the substances treated. The formation of salts by the action of bases or acids, the formation of anhydrides by the action of heat, and the addition or removal of water of crystallization, are not regarded as reactions of the character specified.

It is believed that by such a method of classification as is above outlined the existing handicaps on the coal-tar chemical industry will be adequately and scientifically met.

It would mean the application to the schedule of coal-tar products, in our revenue act, of a careful, thoroughgoing differentiation in the adjustment of tariff rates for a large number of closely allied compounds of common origin, but widely differing in the amount of labor and of highly-trained supervision required in manufacturing processes. It would further mean the application to the class of products in question of the methods so admirably exemplified in the formulation of the cotton and other textile schedules of the Tariff Act of 1913.

It is fully recognized by men of experience and breadth of view that such a schedule is, of necessity, a purely provisional measure, designed to stimulate the establishment of the manufacture on American soil, in nearly its entire complexity, of the whole range of coal-tar derivatives required by our domestic industries.

It is freely conceded that, after a short term of years, the handicap on each successive group of compounds might easily fall to half of the amount adopted for a basic unit, as experience is gained and organization perfected.

There is little doubt on the part of those eager to create this industry in our land, that with such help as is outlined above—in the matter of thorough organization, complete co-operation and perfected legislation—the time is not far distant when it can sally forth into the markets of the world, and meet the competition in foreign fields of the European interests, which hitherto have dominated the international traffic in coal-tar chemicals.

It is fortunate that the growth of this industry is not hampered by patent restrictions. Practically all dyes actually necessary for a complete gamut of colors, available for use on all fabrics, on leather, in paper making, for ink manufacture, etc., are now patent free. A very small number—of marked convenience in certain industries—are under patent protection. Many of these patents lapsed during 1916. A considerable group terminates in 1917. A few expire at intervals, up to 1925.

COKE OVEN BY-PRODUCTS AND THEIR IMPORTANCE IN INDUSTRIAL CHEMISTRY.

By WILLIAM HUTTON BLAUVELT, Consulting Engineer, Semet-Solvay Company.

THE manufacture of coke in the by-product oven is a process of dry distillation in which all the volatile matter in the coal is driven off by the heat, leaving only the coke behind. The volatile matter leaves the oven in the form of vapor laden gases and from them are recovered the by-products of the manufacture of coke, to which so much attention has been called since the beginning of the war. The by-products ordinarily recovered consist of tar, ammonia, gas, benzol and its homologues, and sometimes cyanides. These products do not exist as such in the coal, but are the result of the action of heat on the resinates and other hydrocarbons which mainly compose the volatile matter in coal. The changes through which these bodies pass in the coking process are quite complicated and not well understood.

When we realize to what a large extent the by-products above named from the basis of industrial chemistry it is not difficult to connect the relatively recent importance of the chemical industries in this country with the fact that the by-product coke oven was very slow in development in America. It was only ten years ago that the output of by-product coke per annum was still below the mark of 5,000,000 tons.

AMMONIA.—There is an important link between the by-product coke even in this country and one of our most important chemical industries—the manufacture of alkali, since it was for the purpose of obtaining an ammonia supply for the manufacture of soda by the Solvay process that the first by-product ovens were brought to America from Belgium in the year 1892. Previous to that time the only supply was from the gas works manufacturing coal gas, and then very many of the coal gas plants did not consider it worth while to recover their ammonia, as the demand for it was so inconsiderable. It is estimated that when ovens now under construction are in operation, the production of ammonia, calculated as sulphate, will be at the rate of from 375,000 to 400,000 tons per annum. In addition to the production of ammonium sulphate, the principal use of which is as a fertilizer, the large and growing supply of ammonia from coke ovens has resulted in the regular manufacture of other forms employed in the arts, such as anhydrous ammonia, aqua carbonate, and ammonium nitrate. War conditions have brought prominently to public attention the use of ammonia as a raw material for the production of nitric acid. This process rests on the original invention of Ostwald, in which ammonia and air are passed through a heated tube in the presence of a catalyzer, the ammonia being oxidized to nitric acid. The large and dependable production of ammonia makes it the natural domestic source in the United States of nitric acid, which has become such a vital element in the materials for national defense.

Notwithstanding the recent rapid development in the use of the by-product oven, even on the completion of the large amount of construction now under way, about one-half of the coke used in the country will still be made in bee-hive ovens, which waste all their by-products. The metallurgist has at last accepted by-product coke as superior to bee-hive coke in both blast furnace and foundry cupola, so we are justified in expecting a further large increase in the production of ammonia from this source within the next few years.

BENZOL.—No product of the distillation of coal has attracted as much attention of late as benzol and its homologues. The public has received a large mass of information, especially through certain articles in the public press, regarding the production in the United States of colors and dyes. These publications have given very many people the impression that the reason for our having no dye industry was the lack of raw materials, probably because no one investigated the subject. Even our statisticians seem to have entirely overlooked the fact

that this country has been for years producing millions of gallons of benzol and the other raw materials available for the dye and color industry. Careful estimates from the best data obtainable show that in the year 1914, for exabple, before any of the recent large construction of benzol recovery plants were in operation, there was produced an amount of benzol quite sufficient, if it had all been appled to these purposes, to furnish all the colors and dyes used in America which have benzol as their source, and our tar distillers have stood ready to furnish, at very moderate prices, all the naphthalene and anthracene and other coal distillation products besides benzol that are required in making colors.

For years millions of gallons of benzol have been employed for enriching illuminating gas, for lack of a better market, when the enrichment could have been easily obtained from other sources, and there was practically no market for naphthalene and anthracene for color-making purposes.

It is satisfactory to note that while the ignorance regarding the supply of raw materials for the American color and dye industry was almost universal at the opening of the war, those whose business it is to know have, in most cases, become fully alive to the situation. It is now easy to obtain accurate information regarding the possibilities of the industry and the conditions which must be met. American manufacturers have the money and will and American chemists the brains and the knowledge, and while the great color industry cannot be developed in America overnight, we have all the factors here that are required for success, if properly combined and fostered.

While the color industry itself is represented by relatively small values, some of the most important industries in this country are vitally dependent upon artificial colors.

We learn from government reports that

there are over 14,000 establishments in our country which are absolutely dependent upon dyes and colors. These establishments employ over $3,000,000,000 capital, and it is estimated that over 2,000,000 working men and women are occupied in manufacturing plants which are directly dependent upon the use of artificial colors, and nearly all of these colors depend on the products of the distillation of coal for their raw materials.

TAR.—Coal tar has long been a product of much interest to the chemical manufacturer, since it contains such a large proportion of the bodies which are the raw materials for the organic chemical compounds that are of importance in our industrial life. The industry of tar distillation was first established in this country in 1857, when tar was distilled by Samuel Warren at Buffalo. In 1887 the first plant was established for the production of naphthalene, refined carbolic acid, benzol and nitro-benzol. The industry depended on tar from gas works, and very creditable progress was made in the use of tar for roofing materials, water-proofing and kindred uses. With the advent of the by-product oven the greatly enlarged and reliable supply of tar permitted such a much more rapid growth in the industry of tar distillation. The great increase in improved highways has consumed large quantities of tar and tar products as a binder and water-proofing material, and tar shares with asphalt the primary place as a binder on our Nation's highways.

With the rapidly increasing exhaustion of our timber supply for railroad ties, telegraph and telephone poles, the creosoting of timber has grown to large proportions, and the industry re-

WILLIAM HUTTON BLAUVELT.

Consulting Engineer Semet-Solvay Company in Development of By-Product Coke Oven.

William Hutton Blauvelt was graduated from Lafayette College, mining engineering course, with the degrees of E. M. and M. S.

Early experience, four years in iron blast furnace work, first as chemist, later as superintendent. Then followed several years in gas producer design and installation and the application of producer gas in the arts. Then three years in smelting copper sulphide ores in Montana.

For the last twenty years with the Solvay Process Company and the Semet-Solvay Company, first in building and operating the only large plant of Mond by-product gas producers in this country. Then associated with the Semet-Solvay Company in developing the by-product oven from its beginning in America, and in the manufacture of coke and by-products, first as general manager and later as consulting engineer.

lies upon the tar distiller for its supply of creosoting oil.

The production of tar from the coke ovens and gas works of the country will probably amount to about 300,000,000 gallons at the close of 1917, and from 60 to 70 per cent of this tar is represented by the pitch fraction.

Our large supply of cheap fuel has as yet prevented any important development of the briquetting industry, which in Germany, for example, utilizes so much of the total pitch production, and the increasing demand for the creosote oil and anthracene makes the problem of disposing of the pitch a very live one to the American tar distiller. This subject is being given much study.

GAS.—In most by-product oven plants a portion of the gas produced in the distillation of the coal is utilized for heating the ovens, but about 60 per cent. of the total amount produced is ordinarily available for other uses. On the completion of present construction this surplus will amount to about 200,000,000,000 cubic feet per annum. Most of this gas is used as fuel in industrial plants, but about forty cities and towns in the United States rely entirely, or in large part, on the by-product oven for their supply of domestic gas, and as the advantages of the calorific standard for such gas, as compared with the candle power standard, obtain wider recognition, the use of coke oven gas for domestic purposes will correspondingly increase.

By-product oven plants are usually constructed in large units, and as the domestic consumption of oven gas becomes more widely established, the result will naturally be the production of gas in large quantities at central points with distribution through high pressure pipe lines to surrounding communities.

The distribution of natural gas in America has developed the art of high pressure delivery over long distances far beyond any similar development in Europe. For some years oven gas has been distributed, from one plant at least, to points as much as ninety miles from the place of production. This development is but another illustration of the tendency to concentrate our manufacturing industries in large units, which permits the application of the highest grade of management and engineering skill.

CYANIDE.—In the distillation of coal a certain amount of hydrocyanic acid is usually produced, probably owing to the breaking down of ammonia by contact with the heated surfaces within the oven. There are several methods for the recovery of the cyanides from coal gas, among which are the Davis-Neill, the Feld and Bueb. The last named process has been in operation for some time at one of our prominent gas works, but under ordinary conditions the prices of cyanide products have not made their recovery attractive in American plants. Cyanide is usually recovered in the form of a ferrous salt, which forms the raw material for the manufacture of some colors, such as Prussian blue. It is also used in case-hardening iron, in the dyeing industry for fixing colors, and in photography and some other arts. Large quantities of cyanides are used in extraction of gold from its ores, but this is in the form of the simple cyanides of potassium or sodium, and so far these simple salts have not been commercially obtained from the cyanides as produced from coal distillation.

This brief review of the various by-products obtained from the distillation of coal for the manufacture of coke shows that the by-product oven shows that the **by-product oven has given to industrial chemistry a supply of raw materials sufficient to establish many branches of the industry on a firm foundation and on a scale that will permit these industries to obtain a position of far greater importance in this country.**

We also have all the necessary technical skill, and American capital is prepared to finance their large development if it can be assured of protection against improper competition from other countries where these industries have become fully established with very large capital behind them. It is to be hoped that we may have wise legislation, promptly enacted, so that our manufacturers may be permitted to take advantage of the present opportunity without fear that their undertakings may be destroyed by the powerful competition of the highly organized European industries strongly fostered by government support, which recognizes that co-operation and not competition is the life of trade.

THE ACHIEVEMENT OF AMERICAN CHEMISTS, AS EXEMPLIFIED IN THE PRODUCTION OF COAL-TAR INTERMEDIATES.

By S. R. CHURCH, Research Department, the Barrett Company.

ACHIEVEMENT is defined as "something accomplished or gained," and especially a noteworthy action or distinguished feat. Should the work of our chemists during the past two years in the direction of producing coal-tar intermediates be properly described as an achievement? My answer is, from a practical standpoint, emphatically Yes; from a scientific standpoint, regretfully No. But this negative does not imply lack of ability or failure on the part of our chemists to meet the demands of the situation. It means simply that the chemist has been called upon to produce the goods as quickly as possible, and has not been given time to produce them in the best possible manner and at the lowest possible cost. It may as well be admitted that scientific achievement in chemistry does not and cannot keep pace with such unprecedented demand as has been laid upon the makers of intermediates by the dyestuff manufacturers since the beginning of the European war; or, to be more exact, since about six months after that date.

Really Splendid Efforts.

It would be easy, and it would be more agreeable, to lay emphasis on the really splendid efforts that have been put forth and the really notable results of these efforts. But it seems to me more useful and more fitting that we should inquire, "What must we do in order to make our future position unassailable?" than that we should wave the flag and cry attention to what we have done.

The words of the editor of the Textile Colorist are sober and well chosen when, referring to the significance of the Exhibition of Chemical Industries, he says: "The American chemist has shown his ability to follow known processes, but nowhere was there shown his inventive ability * * * . His work has been solely founded upon textbook information, supplemented by manufacturing ability * * * . It was an exhibition of chemical engineering, not of chemical science."

The manufacture of intermediates for synthetic colors is divided among companies distilling coal tar, those making intermediates only, and concerns manufacturing dyes. Prior to the war the firts class was not engaged in the production of intermediates, because of the very low values fixed on these materials by the producers in Germany; the second very limited group was making aniline oil and salts to the extent of a few hundred tons per year, and the dye manufacturers probably did not engage in the manufacture of intermediates to any great extent.

Production of Intermediates an Achievement.

Therefore the production of intermediates today represents an achievement born and grown to its preesnt stature in two years, even more completely than does the domestic turnout of dyes, as the latter was well grounded in the hands of a few experienced companies many years ago.

It may be interesting to consider the best approximate figures obtainable (admittedly based partly on guesswork) of the benzol and coal-tar derivatives that are being converted monthly into intermediates for dyes, viz.:

	Pounds.
Benzol	3,150,000
Toluol	75,000
Phenol	150,000
Naphthalene	1,000,000
Total	4,375,000

That these are very respectable totals is readily shown if we roughly convert them into intermediates by factors based on average molecular weight, which indicates a total production of about 6,000,000 pounds of intermediates per month—more than enough to produce the entire amount of dyes normally consumed in the United States. Dr. Norton's dyestuff census address before the American Chemical Society (Journal of Industrial and Eng. Chemistry, Vol. 8, No. 11, p. 1039) gives the total imports of the most important colors—that is, those of 10,000 pounds or over—during 1913 and 1914 as 43,000,000 pounds. Dr. Norton estimates domestic dyestuff production for the same year as about 7,000,000 pounds, or a total of 50,000,000, which might be increased to approximately 60,000,000 by unimportant dyes and those probably coming in unrecorded. However, a fairly large share of the benzol consumption is accounted for by aniline oil, and this in turn goes largely into fabrics and is converted into black directly in the fiber, and it is not likely that aniline so used has ever been classed as a dyestuff. Also, it is known that considerable aniline is now being exported. Taking everything into consideration, and making due allowance for the serious losses in the conversion of derivatives to intermediates, due to inexperience, it is evident that at the present time the intermediates are being produced in this country in quantity (though not in variety) sufficient to account for approximately the entire normal domestic consumption of coal-tar dyes.

Intermediates Take but Small Fraction.

When these totals, large as they appear, are compared with the total supplies of benzol and coal tar derivatives available, it will be seen that the manufacture of intermediates will account for only a small fraction of these materials. For instance, the benzol production for 1917 has been estimated at 30,000,000 gallons, or 220,000,000 pounds, of which at the present rate only 37,000,000 pounds would be used for dyes. The potential benzol available (if all metallurgical coke now used was made with by-product recovery) is 100,000,000 gallons, or 730,000,000 pounds. Or, take naphthalene, and compare the present indicated consumption of 12,000,000 pounds per annum in intermediates with the 100,000,000 pounds that could be obtained from the tar produced in 1917. It is then readily apparent that the producers of coal tar derivatives and benzol will not find in the manufacture of colors an outlet for all of their products, and on the other hand, the makers of dyestuffs needs fear no shortage in raw materials.

The manufacture of intermediates has been undertaken by so many and such widely separated concerns, and the information given out is so meager that there is probably no one person who is competent to say just what is being done, or to give a comprehensive list of the intermediates that are now being actually produced. However, if we take the list of coal tar intermediates imported into the United States during 1913 and 1914, as set forth by Dr. Norton in his address mentioned previously, and select from this list all of the products whose importation reached large figures, we find it can be definitely stated that almost without exception these products are now being made here. This list will include aniline oil and salt, B-naphthol, nitrobenzol, dinitrobenzol, dinitrotoluol, ortho and para-toluidine, A-naphthylamine, resorcin, salicylic acid, benzoic acid, diphenylamine, dimethylaniline, hydroquinone, H acid, and many others.

A typical example of accomplishment in the production of an intermediate product not heretofore made in the United States may be cited as broadly illustrative of many similar undertakings. It was decided about May 1, 1916, to make this particular product, the undertaking including purchase of property, erection of buildings, purchase and assembling of apparatus, development of process in laboratory, and training workmen to operate the process. Within four months the material was produced, and within six months it was being turned out in regular quantities and of quality pronounced superior to that formerly imported from Europe. It will be readily appreciated that under such conditions the best yields could not be expected, and that in all similar undertakings much further attention to the refinement of methods will be necessary before these intermediates can be produced on a rational cost basis.

Making Our Position Unassailable.

We have shown, then, that the raw materials are available for a comprehensive manufacture of intermediates; that the American chemists have already demonstrated their ability to produce these intermediates in large quantities on short notice. What must be done to make our position unassailable? Of course, the answer to this depends upon the combined effort and achievement of the producers of intermediates and the makers of colors. In my opinion our chemists must be afforded an opportunity to demonstrate that their ability in real scientific achievement is equal to their already proven ability in rapid and practical output. I am confident that

S. R. CHURCH.

S. R Church was born in Brooklyn, N. Y., in 1879, was educated in the public schools of Easton, Pa., and studied chemistry at the Pratt Institute in Brooklyn, 1900-1904. He became connected with the tar industry in 1900 as factory cost clerk, works chemist, and as an assistant to the factory manager with the Barrett Company. In 1911 on the establishment of a research department he was made manager, and the department has now increased from a staff of four men to twenty-two men, and from 750 square feet of laboratory space to 7,500 square feet.

He is a member of Technical Committees D-4, D-7 and D-8 of the American Society of Testing Materials; of the Technical Committee and Chemical Tests Committees of the American Gas Institute; of the Committee on Preservatives of the American Wood Preservers' Association; of the Committee on Preservation of Poles and Cross Arms of the National Electric Light Association. He is a member of the New York Section Committee, Society of Chemical Industry; councilor from the New York section, American Chemical Society, and is also a member of the American Railway Engineering Association, American Society of Municipal Improvement, Permanent International Association of Road Congresses (delegate to third congress at London, 1913), member of the Chemists' Club, and past president of the Pratt Institute Chemical Alumni Association. He is the author of various papers on the technology of bitumens and wood preservation.

our chemists have this ability, and that they will be equally successful in this direction; but I am of the opinion that much depends upon a better coordination of the research work in this field than has yet been accomplished. There should be a much more complete and definite plan for co-operative undertaking in the study of technical and scientific development leading to new processes, labor-saving devices and economic production generally than now exists.

I confidently predict that our chemists, if given full opportunity to make progress in this field, will not fall short of the achievements that American scientists have accomplished in other fields. In metallurgy, electrochemistry, photochemistry and petroleum technology, in the industries of heavy acids, graphite, celluloid, corn products and many others, the researches of American chemists have yielded results comparing favorably with the best achievements of European scientists. American achievement has generally been signalled by the use of larger units, by labor-saving devices and short-cuts, but has not been pre-eminent in the utilization of by-products and the prevention of waste, and in fine attention to detail. The importance of the latter is now fully appreciated, and there is every reason to state confidently that the American chemist will succeed in this department. However, the ultimate success of the coal tar chemical and dyestuff industry as a whole seems to depend not only upon the efforts of the chemist, but upon the ability and foresight of his employers and of the country's legislators.

THE CHEMIST AND HIS PLACE IN THE PUBLIC SERVICE.

By HARVEY W. WILEY.

THE entry of the chemist into public service is scarcely sixty years of age. In fact, sixty years ago the chemist as a dynamic force was well represented by x+y=0.

The first record I can find of a chemist in the public service is in the Department of Agriculture in 1862. It would be interesting to trace in detail historical data relating to the entry of the chemist into the other departments of the government. That task I shall have to leave for the historian with more leisure than falls to my lot.

By classification the chemical service of the United States Government and of the State and municipal governments may be broadly classed under three heads: First, chemists charged with the duties of control; second, chemists charged with research, and, third, chemists charged, partly at least, with executive duties. The latter classification is a matter of some doubt, as my own experience, as well as that of others, has shown that when a chemist begins executive duties they are like the camel's nose in the tent. Much times does not lapse until his duties are wholly executive. But even then he may well retain his classification, as they are executive duties connected with and based upon chemical work.

Chemists and the Fertilizer Industry.

The nature of the duties of the first class of chemists is well understood. Perhaps I may best illustrate it by laws relating to fertilizers in the various States. The purpose of these laws was not to give chemists jobs, but to protect the farmers against fraud. Practically every State in the Union where commercial fertilizers are used in large quantities has chemists controlling the character of the product offered to the farmer. Not infrequently the chemist who has control of the analysis also has more or less to do with th application of the law, but this is not necessarily nor usually the case. In respect of fertilizer control, not only is the total amount of plant food represented by fertilizer of great importance, but also even of greater importance the percentage thereof immediately available. Farmers are not very prone in this country to farm for the future. It is difficult to convince them that if they apply an untreated, fine-ground mineral phosphate to their soils, sooner or later it will all be available for crops. They are looking largely for the next crop. Lawes and Gilbert, in England, were the first to recognize the fact that ordinary phosphoric acid in bones and mineral phosphates is not readily available. To them we owe the process of freeing the phosphoric acid by treating the bones and mineral phosphates with sulphuric acid. On this discovery the great acid phosphate industries of the world have been founded. The control chemist determines, therefore, the quantity of phosphoric acid present which may be regarded as immediately available—that is, of course, within the year. Some residues, of course, are carried over, but these are not lost, and return value to the farmer in subsequent crops.

Of similar character also is the work of the chemist in the firms with which he traded. Presumably, from the very beginning those firms engaged in the manufacture of fertilizers had chemical control and employed chemists. They, therefore, fully understood the nature of the products which they offered. They were under no obligation, however, to disclose their formulas to the purchaser. As a matter of fact they did not do so until the State laws came into vogue. It is rather strange that, in so far as fertilizer control is concerned, the national Congress has taken no action looking to the control of the fertilizer trade in interstate commerce. It seems that a law of this kind would be of great help in various States in helping them to secure a more rigid enforcement of the State laws.

Chemists and Administration of Laws.

I come now to the discussion of the third classification of chemists—namely, those charged with the administration of the laws in which chemical analysis and investigation lay the foundation for the law's enforcement. The head chemists who are employed in the various national, State and municipal laboratories having control of products entering into interstate and State trade are all in the third class of my subject. The amount of time which they give to the executive work of the departments varies. Some of them have important duties in the laboratory, others only supervisory duties, but in all cases they remain in close touch with the work going on in their laboratories and the progress which is made in chemical science. The character of the work of this class of chemists, of course, brings additional responsibility.

The question naturally arises, "What rule of conduct should the executive chemist adopt for his guidance?" The platform on which he stands determines very definitely the character of the work which he does. First of all, it is the duty of every executive chemist under any national, State or municipal law to fully comprehend the purpose of the law under which he is working and the terms in which its provisions are expressed. In this work he should be guided by the universal principle of the courts in interpreting an act intended for some public benefit, and practically all acts are so intended. The principle of construction adapted by the courts is extremely simple—namely, if the law be capable of more than one interpretation that one should be adopted which more nearly carries out the provisions and purposes of the act.

If, for instance, the law requires that the steel which is used for the manufacture of ordnance should be of a certain fine quality and that the impurities in the steel which tend to impair its quality should be as nearly as possible omitted, the chemist has a fairly good working hypothesis. He will ascertain just what composition of the steel is best suited for the purpose, especially its tensile strength, endurance and tenacity. If he finds these conditions are based upon a certain minimum or maximum, as the case may be, of carbon, manganese, etc., he will require that the manufacturer of the steel prepare it according to these ideas. If the standard which he sets is reasonable it, of course, is one which can be maintained. Whether or not it is reasonable depends upon the terms of the law and the conditions surrounding the production of the best material. The law may be specific, in which case the executive chemist has no responsibility. But if the law is general as to the quality then the responsibility of getting the best quality rests upon him.

The materials which are employed in the manufacture of standards, for instance, are required to be of such character as to be the least variable under the conditions in which standards are utilized. The degree of expansion by heat or contraction by cold, resistance to oxidation and all other properties which go to make an excellent standard are to be carefully studied and those materials only accepted that conform to the required chemical and physiological tests.

Supervision of Therapeutic Reagents.

Another illustration which is very patent is in the supervision of therapeutic reagents by the Public Health Bureau of the Treasury Department. The various sera, vaccines, etc., which pass from State to State are subject to inspection and approval by this Bureau. The tests which are made are chemical, physical and pharmacological, and the chemist bears with the physicist and pharmacologist his share of the responsibility of securing a serum or vaccine of maximum vitality and of minimum threatening content. Much of the objection which has been made to serum therapy and vaccine prophylaxis has been due to the carelessness in the manufacture of these bodies. Occasionally a product is made which is infected with streptococcus and stophycoccus and tetanus bacillus or some other dangerous infection and the result is always disastrous and will result very greatly in the production of opposition to these procedures. While it is true that the chemist exercises only a minor part of this control, it is at least an important part.

Bureau of Mines.

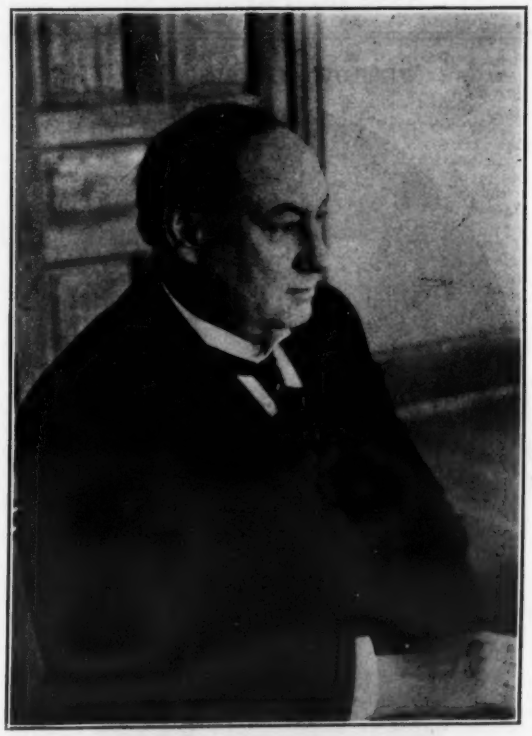
The chemists in the Bureau of Mines should a very heavy responsibility. Accidents in mines are usually of a chemical character. They are produced very generally by the explosion of combustible gases. The origin of these gases, their control and the precautions which are necessary to minimize the danger are almost purely chemical problems. The head chemist of the Bureau of Mines is, therefore, called upon to discharge not only the chemical duties of the highest character, but also executive duties in the proper interpretation of his duty for the greater safety of life.

Geological Survey.

In the Geological Survey the chemist has a very great responsibility as an executive head in addition to his skill as an analyst and a student of chemical theories and problems. The development of the industries of the country depends largely on a proper census of natural and national wealth, and the best means, as far as chemistry is concerned, of utilizing this natural wealth in a manner best suited to the interests of the public at large. The executive chemist, therefore, has this duty always in mind, that in the exercise of his functions in the interpretation and application of data he should always keep in mind the cardinal principle of public benefit.

There is perhaps no field in which the executive chemist is called upon to exercise a greater responsibility, in the nation, States and municipalities, than in the duties which fall upon him in connection with the food and drugs laws. Here we have a wide field of activity which I can speak of with some degree of authority because of my long service in an executive capacity in connection with work of this kind. The food and drugs laws of the State and also of the different States which are modeled largely on the Federal law leave a large discretion to the executive officer in charge of the laboratories. This officer is charged by law with ascertaining whether or not a given sample is adulterated or misbranded. First of all, before he reaches any conclusion in this matter, the nature of the substance must be known; a rigid chemical and physical examination of the sample is therefore precedent to any executive action or to any interpretation of data. It is the duty of the executive chemist to provide the proper supervision over the work of his assistants, and to know by personal inspection and test that this work is accurate and thorough. Slip-shod methods of analysis will easily grow up in a laboratory if the executive head thereof does not take an active part in the supervision of the work. It is his duty also to direct the research chemists in that line of investigation which to his mind seems most fruitful of good, and if he be trained in research work to aid and support the research work of this kind. Most of all, however, his responsibility is greatest when he is called upon to come to the final decision as to whether or not the given sample is

HARVEY W. WILEY.



Harvey Washington Wiley was born in Kent, Ind., October 18, 1844. He was educated at Hanover (Ind.) College, Indiana Medical College, Harvard University, and the University of Berlin. He taught chemistry for nine years at Purdue University, and in 1883 became chief of the Bureau of Chemistry of the United States Department of Agriculture, at the request of Commissioner George B. Loring, of Massachusetts. At first Dr. Wiley devoted himself principally to agricultural chemistry, writing three volumes on its "Principles and Practice," also many booklets on such subjects as "Commercial Fertilizers" and "Mixed Sugars." He did much to foster the development in this country of the beet sugar industry. In 1901 he began work with his famous "poison squad," a group of twelve young men who voluntarily tested on themselves certain chemicals then used freely in preserving food and believed by Dr. Wiley to be deleterious. The result of this experimentation was the famous pure food and drugs act, written by Dr. Wiley and passed by Congress, June 30, 1906. Under this law many food adulterators have been prosecuted and the use of borax, salicylic acid, formaldehyde and sulphuric acid in food has been forbidden. Charges were made against Dr. Wiley in 1911 in connection with the employment of Dr. H. H. Rusby, who has just resigned as pharmacognocist at the port of New York. Nevertheless, Dr. Wiley was upheld and praised by President Taft. He resigned from the Bureau of Chemistry in March, 1912, charging that his activities were being restricted and that the fundamental principles of the food and drugs act were being paralyzed. Since that time he has engaged in literary work. He is a member of A. M. A., A. Ph. A., American Public Health Association, Society Chemical Industry. He has received the honorary degree of Ph. D., LL. D. (twice) and D. Sc., and France has elected him Chevalier du Merite Agricole and Chevalier of the Legion of Honor.

in harmony with the general principles of the law under which he is working.

Chemists Under Oath.

In the national and municipal laboratories, chemists are required to take an oath to faithfully support the Constitution of the United States or State and to discharge the duties of his office in harmony with the requirements of the law. He, therefore, cannot evade his duty. He must perform it. The principle which guides his work is practically the same as that which has already been enunciated. He must use his judgment in such a way, when there is conflicting evidence, as to best carry out the purpose of the act. The executive chemist in this case is not the judge or jury; his action is to determine whether or not a court should pass upon and review his decision. If he comes to the decision that the given article is not adulterated or misbranded, whether it be a drub or food, that settles the question, in so far as further proceedings are concerned. There is no one who can review his work. If, therefore, he makes a mistake and decides in the wrong way, he incurs a very heavy responsibility, or rather he fails to discharge a duty.

Give Benefit of Doubt to Public.

As far as I am personally concerned, I always had one invariable rule in all cases of this kind; namely, if there were conflicting evidence, to give the benefit of the doubt to the public. This rule I also applied in all synthetic foods to which materials had been added other than nature had provided. Unless it was evident beyond question that the addition of extraneous materials had for its purpose a better product for the public, their presence was always considered as a suspicious circumstance worthy of further review before the courts. If, for instance, the manufacturer of butter used a moderate amount of salt to meet the general requirements in this country for salted butter, such an addition would not be considered a violation of law. If, on the other hand, he added a preservative agent with no organoleptic property such as borax, this would be regarded as an adulteration under the law and warrant the executive chemist in citing the offending parties to the proper officials to defend their action in court.

We all know as a matter of history what a tremendous pressure has been brought to bear upon executive chemists in control of foods and drugs to influence their decision favorable to the trade rather than to the public. I do not, however, intend here to go further into this important principle as, if I should, it would be writing a history than a paper. I will only add, however, that all efforts made by executive officers to minimize the possible danger of addition of substances to foods and to condone or favor such activities have been in my opinion wholly illegal, contrary to the public welfare, and violative of the fundamental principle of the law.

In the Advisory Board, appointed to aid the Secretary of the Navy in the proper discharge of his duties and for other purposes in connection with the welfare of the people of the country, our society is represented. Importance of research along the line of economical and industrial development cannot be overrated. Of still greater importance, however, is the necessity of a rigid investigation of the causes which are producing the physical inefficiency of our nation. When we realize that more than sixty per cent of the young men who offer their services to the army and navy are rejected for physical reasons, the low condition of physical efficiency in our country is made apparent.

Improper Nutrition and Efficiency.

To my mind, the principal cause of this physical inefficiency is due to improper nutrition. Important subsidiary causes are the use of alcohol, tobacco, tea and coffee, Coca-Cola and other bodies that have specific effects upon the nerves. The chemist of necessity must take the leading part in the researches which shall lead to a better physique and freedom from moral and intellectual deficiency. The supreme importance of a better physical manhood and womanhood, which would bring a better mental and moral efficiency of the people, is slowly becoming recognized. The work of the research chemist in public life is too often curtailed by supervisory and executive duties. An increasing field for the exercise of research activities will undoubtedly be open in official service.

Chemists in Official Service.

It would be of interest to have a census of the number of chemists found in official service. I hope that some statisticians will take up this subject especially for the archives of the society. The Chemical Society of Washington has made a beginning of this work and in their list of members printed in November, 1915, they have given the number employed in the various departments of the Federal Government, the army and navy, and in schools and institutions. I do not mention this at all with a view of indicating that all chemists in the public service are members of our society, but this list does give the number in each department that are members. For instance, in the Department of Agriculture, the number of chemists in the Bureau of Chemistry is 93; in the Bureau of Soils, 25; in the Bureau of Plant Industry, 13; in the Bureau of Animal Industry, 13; Miscellaneous 3; total, 147. The number of chemists in the Geological Survey, Department of Interior, is 9; Patent Office, 11; Bureau of Mines, 2; National Museum, 1; total, 23 in the Department. There are 38 chemists in the Department of Commerce; 15 in the Treasury Department; 4 in the Army and Navy; 28 in Schools and Institutions, and 43 in the miscellaneous and unclassified service. There are 14 members of the society employed in Maryland. This makes a total of the members of the Chemical Society employed in the Government Laboratories at Washington and nearby, 315. In addition to these members also it is not to be forgotten that the Department of Agriculture and the Treasury maintain a number of laboratories in different parts of the country, and the chemists in those laboratories are not included in the membership of the Washington branch, but will be found in the local branches where they are situated, such as New York city, Philadelphia, etc. The total number in these laboratories is probably as large, if not larger, than those in the Bureau of Chemistry.

In addition to these official chemists, we should not forget that almost every State has a chemical service consisting of from five to fifteen or twenty persons, which multiplied by the total number of States will give an approximate idea of the total number of chemists thus employed. The municipal chemists are perhaps more numerous even than the State chemists, although I have not endeavored to make a census thereof, but supposing they are of the same number, then we have approximately as members of the Chemical Society 1,300 chemists who are employed in official work of some kind or another. This is indeed a formidable number, but does not by any means include all the chemical service which is given for official purposes in the United States.

I cannot close without testifying to the splendid effect which the organization of the American chemists has had upon the individual members. I can hark back with little difficulty to 1876, when I first joined the American Chemical Society two years after its foundation. I have always regretted that I had not been one of the chemists to journey to the grave of Priestly in 1874 and take part in the original membership of our organization. This, however, was the first year of my chemical activity and I either had no notice of this meeting or failed to take advantage of it. At that time, although connected with the agricultural education in Indiana, I had no official contral of any product. It was not until several years later that Indiana established the office of the State Chemist and placed me at its head by designating as that official the Professor of Chemistry at Purdue University. Since that day, continuously until my separation from the public service, in March, 1912, I held official positions in which as an executive officer I felt the obligations of trying to serve as well as possible the people of the United States. It was, therefore, with pleasure that I accepted an invitation to give a short paper on this subject because I feel that through our organization the higher spirit of service has been imparted to our membership and a deeper sense of the obligations under which they rest to do well and faithfully the things confided to their care.

THE TESTING AND STANDARDIZATION OF LUBRICATING OILS.

By WINSLOW H. HERSCHEL, Assistant Physicist, United States Bureau of Standards.

I.—What Are Lubricating Oils?

IN all kinds of machinery there are surfaces, usually flat or cylindrical, which have a slow or rapid motion with reference to other surfaces. In the most unusual case, the revolving journal is concentric with a stationary bearing, with a narrow annular clearance between the two. Unless this clearance space is filled with some material which keeps the surfaces apart, metallic contact takes place and causes a great increase of frictional resistance, as well as wear of the surfaces. In order that any material may act as a lubricant, it must not be entirely expelled from the bearing by the pressure which tends to force the surfaces together. The retention of the lubricant in the bearing depends both upon the properties of the lubricant itself and on the construction of the bearing.

A lubricant may be either a solid, a liquid or a gas. As an illustration of this last extreme case, Kingsbury* has shown experimentally that air would act as an effective lubricant for a trunk piston which was carefully fitted into a cylinder, so that the diameter of the cylinder was about 0.0008 inch greater than that of the piston. Among solid lubricants, talc and graphite are commonly used. The use of water as a lubricant in the step bearings of vertical shaft steam turbines, is also well known. In this case, although the pressure is very great, the construction of the bearing prevents the lubricant from being forced out. A mixture of water and a specially prepared graphite also makes a very good lubricant.

Thus it will be seen that all lubricants are not oils. It is also true that all oils are not suitable for use as lubricants, and some oils, although they give satisfaction at first, are objectionable because they do not retain their good qualities in use. In order to get a clear idea of the properties which are desirable in a lubricating oil, it is necessary to consider the difference between dry and fluid friction. The co-efficient of friction is equal to the force necessary to produce motion, divided by the perpendicular pressure, or in the case of a journal, it is the tangential frictional resistance at the rubbing surface, divided by the load on the bearing, or the turning moment divided by the product of the radius of the journal by the load. In the case of dry friction, the resistance is proportional to the load, so that the coefficient is independent of the load. It is independent of the velocity and also of the area, provided there is no abrasion. On the other hand, with fluid friction, the turning moment is independent of the load, so that the coefficient of friction varies inversely as the load. The turning moment is proportional to the velocity, and inversely proportional to the thickness of the oil film.

When the attempt is made to compare these laws with the results of experiment, it is found that there are many complications, because the friction may be either dry or fluid, or both of them, in various proportions, depending on the design of the bearing, the properties of the lubricant and manner of introducing it, and upon the speed and pressure. By pressure on a bearing is meant the total load divided by the product of the length and diameter of the journal.

Where it is desired to make the most economical use of oil the bearing is flooded, as with forced feed lubrication, and this makes it possible entirely to avoid dry friction, if a suitable oil is used. It will be assumed, for the sake of simplicity, that there is only fluid friction and that the clearance between the journal and its bearing is so small that there can be no question of turbulent flow of the lubricant. In this case there can be no slip between the surfaces and the lubricant, the entire resistance being due to shear in the lubricant itself. In the older theories of lubrication it was assumed necessary to introduce some coefficient of cohesion, adhesion, slipping, or the like, but in the latest and most probable theory of Sommerfeld,† all these are omitted, and the laws of lubrication are based entirely on the viscosity, a property of the lubricant which will be considered later in detail.

Sommerfeld has shown mathematically, and the experimental work of others has proved the substantial correctness of his theory, that there is one particular viscosity for which the friction will be a minimum, for a given journal, running at a certain speed

*Jour. Am. Society of Naval Engineers, Vol. 9 (1897); Trans. A. S. M. E., Vol. 17, p. 116.

†For the main points of Sommerfeld's theory see M. D. Hersey, Trans. A. S. M. E., Vol. 37, p. 167 (1915).

WINSLOW H. HERSCHEL,

Winslow H. Herschel, assistant physicist of the Bureau of Standards, was born in Boston in 1873 and graduated from Harvard in 1896, after taking in the Lawrence Scientific School most of the work required for students in civil engineering. From 1896 to 1904 he was engaged in surveying and hydraulic work in the vicinity of New York city. In the latter year he went to Zurich, Switzerland, as technical correspondent for the Allis-Chalmers Company, to study the design of hydraulic turbines and centrifugal pumps, both at the Zurich Polytechnikum and at the shops of Escher, Wyss & Co.

In May, 1905, Mr. Herschel entered the employ of the Providence Engineering Works in a similar capacity, remaining in Zurich, but devoting his attention to steam turbines. After his return to the United States in November, 1905, he was for five years in charge of the steam turbine work of the Providence Engineering Works until they sold out to the United States Motors Company, and discontinued the building of steam turbines. The three summers of 1911, 1912 and 1913 he spent in Pittsburgh as inspector on the lock gates and chain fenders for the Isthmian Canal Commission.

Mr. Herschel went to the United States Bureau of Standards in December, 1916, as assistant physicist, and was shortly afterward assigned to the duties of oil engineer.

and under a certain load. The viscosity necessary to attain this desirable minimum increases as the speed decreases, or as the load increases. If the viscosity is too great the resistance will be unnecessarily increased, but if it is much too low there will be a much greater increase of resistauce, due to metallic contact. It is, therefore, preferable to have a lubricant of too high rather than of too low a viscosity, especially since the viscosity of the lubricant becomes greatly reduced if the bearing is accidentally heated above its normal running temperature.

It is not necessary to go into all the details of Sommerfeld's theory, but enough has been said to show that a lubricating oil must have a suitable viscosity. In the second place, it must retain this viscosity and its other properties as long as possible. The drying properties of linseed oil, which make it valuable in paint, wholly unfit it for a lubricant. While this is an extreme case, it indicates that the best lubricating oil, other things being equal, is the one which evaporates the slowest and changes the least in viscosity during the process. In other words, a good oil must not gum.

As long as oils were fed from an oil cup and not used over again, it did not make much difference how much they deteriorated in use. But with the forced feed lubrication, it became important that they should not change, by emulsifying, sedimentation or any other physical or chemical process. It hardly needs to be mentioned that a good lubricant should not be acid enough to discolor metal, nor contain any form of adulterant or grit which could injure a bearing.

It is possible that other properties than viscosity and durability are of importance in an oil, such as surface tension, or the rate of change of viscosity with pressure, but these are certainly of minor importance. Many authors speak of the "oiliness" or "body" of a lubricant, but this property has never been satisfactorily defined, nor has sufficient evidence been presented to prove its existence. If there really is such a property, then a bearing, under a given load and with a given speed, would have a different resistance with one lubricant than it would with another lubricant of the same viscosity, but with a greater body. This is affirmed by some and denied by others, but I believe most of the evidence is against the existence of body. At any rate, there is no recognized test by which an oil of high body may be selected, and until such a test is available, there is no choice but to select oils without reference to the quality of body. The matter is a complicated one because the friction depends upon the clearance and upon the temperature of the oil film in the bearing, both of which are difficult to measure experimentally. That two oils have the same viscosity at one temperature is no indication that they will have the same viscosity at another. Hence if two oils were found to have the same viscosity at the temperature at which the viscosity measurements were made, or at a temperature assumed to be that of the bearing, but one of them had a higher viscosity at the temperature of the oil film, this would appear to have the greater body, if the viscosities were below that required for the minimum friction.

Apart from the question of body it will be seen from what has been said that it is difficult to give a concise answer to the question, "What is a lubricating oil?" It may be said, however, that an oil which gives satisfaction as a lubricant must have a suitable viscosity which is retained in use. Whether an oil fulfilled this requirement might be determined by identification of the oil with another which had proved satisfactory in use, by service tests or by laboratory tests.

2.—How Should Lubricating Oils Be Tested?

Most of the older specifications were written with the object of excluding all oils not like the approved sample, and this was a comparatively simple matter, since any property of the oil, whether or not it had any significance with regard to the value of the oil as a lubricant, would serve equally well as a means of identification.

This method has proved most unsatisfactory, although it did well enough as long as all petroleum crude oils came from the same fields. But as new fields were opened up, it became evident that oils of a certain density, for example, might have one viscosity if the crude oil had come from one field, but an entirely different viscosity if the crude oil had come from another part of the country. Hence, to write a value of density as well as of viscosity into specifications can have no other effect than to limit the oil to the products of a certain field and thus restrict competition to no useful purpose.

Another reason for the failure of these older specifications was that the emphasis being on identification, it often happened that no mention was made of some property which determined the lasting qualities of the oil, so that, of two oils which appeared exactly alike when tested before use, one would last for years in forced feed lubrication, while the other might not last for an equal number of months.

By a service test is meant the trying of an oil on the actual machine for which it is intended, under the same conditions of use. It cannot be denied that this method is certain, though expensive and time consuming. Operating engineers object strenuously to having their machines used for experimental purposes, and not without reason, for it means additional work for them, which, as they believe, could be avoided by the continued use of some known and tried brand.

From the point of view of the purchasing agent there is no certainty that a brand will remain of uniform quality, or that a large proportion of the cost is not due to advertising expenses, rather than to the superior quality of the oil. Buying by brand has the objection of needlessly restricting competition and increasing prices, provided methods of testing may be devised which will insure the rejection of unsuitable oils.

A form of contract used in the purchase of lubricating oils for the railroads is for the refiner to guarantee that the cost per car mile, or engine mile, shall not exceed a certain amount. This form of contract is not applicable to stationary engines without modification. A guarantee might be made that the amount of oil required to give satisfactory lubrication would not be in excess of a certain volume per million revolutions of the engine, or, for another example, that the number of revolutions run on one drop must be at least a certain number. As drops vary in size, the method of drop measurement would, in the latter case, have to be stated. However, no such method is in general use and the common plan in purchasing oil for stationary engines is to specify the brand, with, perhaps, as in the navy, a thorough testing of brands by laboratory and service tests, before they are put on an approved list.

Thus, in any case, laboratory tests are necessary in order to see whether oils fulfill the specifications, or, what amounts to the same thing, to make sure that brands are of uniform quality. Laboratory tests may be chemical, physical or mechanical. By mechanical testing is usualy meant the determination of the co-efficient of friction by means of a friction testing machine. Such machines, as ordinarily made, are objectionable because they are not supplied with a complete bearing, encircling the journal, so that there can be no variations of the amount of eccentricity of the journal in the bearing as with a real shop machine. This variation of eccentricity with the speed has a marked influence on the friction, and, therefore, there is always a doubt as to what extent the results obtained on a friction testing machine are applicable to shop machines. Furtherfore, if, as is believed, there is no such property as "body," a friction testing machine can determine nothing more than the viscosity of the lubricant, which may be more easily measured by means of a viscosimeter.

To summarize the answer to the question, "How should lubricating oils be tested?" laboratory tests should be used as much as possible to avoid the trouble and expense of service tests. Yet the final judgment upon an oil must be based upon a service test, and laboratory methods must be revised when they do not lead to the same conclusions.

3.—What Has Been Done Towards Standardization?

Progress in the standardization of laboratory tests for petroleum lubricating oils has been discouragingly slow, on account of the preference for buying and selling by brand and the fear of other specifications. It must be granted that there has been some justification for this fear in specifications written to restrict competition, but the fact that old specifications have been unfair is no indication that specifications cannot be written which shall be advantageous alike to the buyer and the seller. For an equitable specification, which can be enforced in a contract without causing misunderstanding, it is necessary that all the desirable qualities of an oil should be expressed by numerical values, obtained by reproducable tests, which are standardized so that there can be no question in regard to method.

Standardized tests should be considered in connection with their use in specifications, for it is evident that there is little necessity to standardize a test which is used only for research work, and that the main use of a standardized test is to determine whether a certain sample fulfills a certain specification. Among the bodies which are working on standard methods of testing lubricating oils may be mentioned the American Society for Testing Materials, the Independent Oil Men's Association, the United States Navy and the United States Bureau of Standards, and it is hoped that eventually all may agree at least on certain broad, general principles. Practically nothing has been accomplished as regards the adoption of standards, and all that can be attempted here is to discuss the tests now under consideration and the tendencies which they indicate.

Viscosity.

If a viscosity test is used merely as a method of identification, almost any of the viscosimeters in use would serve the purpose, though it would be a great convenience if some one instrument could be agreed upon, to avoid the calculations necessary to change from the readings of one instrument to those of another. Both the Saybolt Universal and the Engler instruments, the two viscosimeters most generally used in the United States, have been recommended to the American Society for Testing Materials. Since there are many types of viscosimeters in use, there is a necessity for a great many conversion tables. Only one table would be necessary for each type of instrument if generally accepted tables were available for changing the readings of a viscosimeter into absolute viscosity.

The unit of absolute viscosity in the C. G. S. system may be defined as the force in dynes, which will give a surface of unit area at a unit distance from another fixed surface, a velocity of one centimeter per second, when the space between the two surfaces is filled with the viscous liquid. The measurement of viscosity is usually made by allowing a measured volume to run through a capillary tube, under a known pressure, the viscosity being then given by the formula

$$\text{Viscosity} = A\,t - B/t$$

in which A and B are constants of a given instrument, to be obtained by calculation or experiment, and t is the time of discharge, usually expressed in seconds.* This equation has been theoretically derived and experimentally confirmed for long tube viscosimeters, but cannot be applied, without certain precautions, to short tube viscosimeters such as the Engler and Saybolt Universal. The subject is now under investigation and it is hoped that these instruments may be used to determine approximate values of viscosity, accurate enough for technical purposes, by slight modifications in the constants of the equation.

This would be a great advantage, because absolute viscosity, apart from inaccuracies of measurement, is independent of the instrument by which it is determined. There appears to be a growing sentiment toward expressing viscosity in absolute units, and if this were decided upon the necessity would be removed of adopting any particular instrument as standard. Absolute viscosity serves more than the purpose of identification, since both the resistance to turning and the load which a bearing will carry, are proportional to it. A step in the right direction, not quite so radical as to require that viscosities shall be expressed in absolute units, would be to specify that viscosity shall be determined only with those types of instrument for which tables, to convert the readings into absolute viscosity, are available. This would at least eliminate many of the present meaningless viscosity determinations.

Since the running temperature of a bearing is apt to be increased from accidental causes, and the viscosity of the lubricant decreases as the temperature increases, it is desirable that an oil should change as little as possible with the temperature. On this account it is becoming usual in specifications to state that the viscosity must lie between certain limits at one temperature and must not have over a certain value at some lower temperature. This makes certain that the change in viscosity between the two temperatures shall not be excessive, as would be the case, if, for example, the oil was adulterated with soap. This property of soap is turned to advantage in the case of grease, where it is desirable that the loss of viscosity with an increase of temperature shall be sufficient to make the lubricant flow readily at the higher temperature.

Density.

The test for density is one of those which, though usually made, serves only as a means of identification. While it would be preferable to leave all mention of density out of the specifications, when this is not done, the density should at least be expressed in a manner about which there can be no dispute. Unfortunately, all manufacturers of Baumé hydrometers do not graduate them according to the U. S. Standard Baumé scale, and tables often used to reduce the volumes of oil to volumes at the standard temperature of 60° F. (15.6° C.) are inaccurate. As pointed out by Bearce and Peffert the combined effect of the errors in the hydrometer and the tables may amount to more than two degrees Baumé, as compared with a correct hydrometer and the tables of Bureau Circular No. 57. Such an error is sufficient to lead to controvery between shipper and buyer, and even to the rejection of a delivery.

Flash and Fire Points.

Unlike viscosity, the flash and fire points must always remain purely arbitrary values, depending on the instrument used and the method of operation. It is, therefore, merely necessary that the tests should be reproducible and that as many laboratories as possible should agree upon the same instrument. The Abel-Pensky and the Pensky-Martens tester, as modified by the Bureau of Mines, "have been officially adopted by the National Fire Protection Association and the Independent Petroleum Marketers' Association of the United States, and are now being considered for adoption by committees on tests of the National Petroleum Association, the American Chemical Society, the American Society for Testing Materials, the International Petroleum Commission and the American Petroleum Society.‡ Of these two instruments the Pensky-Martens tester is for oils flashing above 110° C. (230° F.) and would, consequently, be used for lubricating oils.

A flash point of at least 300° F. (148.9° C.) is necessary on account of legal restrictions, to reduce the risk of fire, but much higher flash points are usually specified, especially for oils for cylinder lubrication of steam and internal combustion engines. Bryan's investigation of motor oils, however, seems to indicate that such high flash points are not as necessary or valuable as they are usually considered.**

Free Acid.

It is recommended by a committee of the American Society for Testing Materials, as is the practice of the United States Bureau of Standards, that free acid shall be reported as the fraction of a milligram of potassium hydroxide (KOH) required to neutralize one gram of the oil. In specifications prepared by the Bureau of Standards a value of from 0.05 to 0.15 milligram is allowed for pure mineral oils, depending upon the purpose for which the oils are to be used. The addition of fatty oils, in what are known as compounded oils for steam cylinder lubrication, would tend to increase the acidity, so that a higher value should be allowed, depending on the percentage of compounding. As shown by Waters†† the acidity is also increased by exposure to sunlight, so that tin containers, rather than glass bottles, should be used in forwarding samples for test.

Cold Test.

The tests thus far considered apply to lubricating oils for all purposes, but the cold test and other tests to be described, apply more particularly to special classes of machinery. When an oil is to be used on refrigerating machinery, or out of doors in winter, it is important that it shall not become too viscous to flow readily, at the low temperature to which it is exposed. To guard against this some form of cold test is necessary. This test is under investigation by a committee of the American Society for Testing Materials, and they have found that very discordant results are obtained, because the temperature, which is called the "cold test" or "pour test," depends not only on the exact method of procedure, but also on the temperature variations of the sample of oil previous to making the test.‡‡ The test is, therefore, of little significance unless all the details in connection with carrying it out have been stated.

Carbonization.

An automobile cylinder oil should not leave a deposit of carbon on the spark plugs and elsewhere inside the cylinder. Frequently oils are blamed for such a deposit when it is in reality mainly due to the use of an excessively rich mixture of gasoline. There is, however, a great difference in oils. Two classes of tests are used to determine whether this deposit may be expected in excessive amounts. The carbon residue test consists of distilling a given quantity of the oil, under certain standard conditions, and weighing the carbon remaining upon the walls of the flask. Waters,* however, has shown that carbonization in a motor cylinder is due to only a limited extent to cracking. In his carbonization test the oil is heated to 250° C. (482° F.) for three hours, diluted with petroleum ether and set aside for 24 hours. The precipitate is filtered out, washed with petroleum ether, dried and weighed. It will be seen that this test is similar to the test for asphalt or tarry matter, as measurement is made of the amount of asphaltic material formed by the oxidation due to prolonged heating. In the specifications

* See Scientific Paper No. 278 of the U. S. Bureau of Standards, p. 319, by E. C. Bingham.

† Technologic Paper No. 77 of the U. S. Bureau of Standards, p. 25.

‡ I. C. Allen and A. S. Crossfield, Technical Paper No. 49 of the Bureau of Mines, p. 26.

** Journal Am. Society of Naval Engineers, Feb., 1915.

†† C. E. Waters, Technologic Paper No. 73, U. S. Bureau of Standards.

‡‡ Proc. Am. Society for Testing Materials, Part 1, p. 281, 1915.

* C. E. Waters, Technologic Paper No. 73 of the U. S. Bureau of Standards.

for automobile oils prepared by the Bureau of Standards, the maximum allowable carbonization, by Waters' method, has been tentatively set at 0.15 per cent., though oils with much lower carbonization values are on the market. It is probable that a low carbonization value is also very important in the case of oils for air compressors and refrigerating machinery.

Resistance to Emulsification.

For steam engine cylinders, except where superheated steam is used, and for marine engines, it is considered necessary to have emulsifying oils. For most other purposes, and especially for high speed engines and turbines, it is necessary that the oil should not emulsify, for an emulsified oil cannot be filtered, and, therefore, cannot be used in a forced feed lubricating system. A method has now been devised by which the resistance of an oil to emulsification may be expressed by a numerical value.† The method consists of stirring two parts of water and one part of oil by means of a flat paddle, which is run for five minutes at a standard temperature and speed, and then allowing the emulsion or mixture to stand. The resistance to emulsification, or "demulsibility," as it is called, is expressed as the rate of separation of the oil from the emulsion, in cubic centimeters per hour. In the specifications for turbine and spindle oil prepared by the Bureau of Standards, and now in use, a demulsibility of 300 c.c. per hour is given as a minimum value, which is equivalent to requiring that the oil shall separate out in four minutes or less. The best turbine and transformer oils settle out in one minute. No difficulty has been experienced in procuring oils which will meet this specification, and since it has been in use, no complaint has been received of oil which emulsified in service.

† See Power, April 4, 1916, p. 485. A more extensive discussion of this test is contained in a Bureau of Standards' paper, now in press.

PETROLEUM, THE MODERN WONDER WORKER.

By VAN H. MANNING, Director of U. S. Bureau of Mines.

THE average man in the ordinary run of life fails to realize the position of importance that petroleum holds in the daily routine work of the world. He merely thinks of it in the limited field of his activities, and when confronted with the already extensive and still expanding uses of petroleum, he first doubts the information and then is somewhat amazed.

Practically every industry makes use in a measure of petroleum or of some of its various products. To list all of the products derived wholly or in part from it would be quite impossible in this short article and would serve no purpose unless a detailed explanation of many of the technical uses were given.

It may be of interest, however, to call to mind some of the more important and better known products and in so doing we may roughly arrange them under the general headings of (1) fuel and lighting, (2) lubrication, and (3) manufactures and trades.

Fuel and Lighting.

Although a large percentage of the lower grades of crude oil has been burned under boilers for the purpose of generating steam, such use is not advocated by the Bureau of Mines, because it is a very uneconomical utilization of a limited and too valuable natural resource. Fuel oil is supplanting the use of coal for naval purposes in all the leading navies of the world. It permits of a greatly increased steaming radius, is more easily loaded and stored on board, permits of increased speeds being obtained, and allows great reduction in the number of men needed in the boiler rooms. In addition, the fact that crude oil can be burned without making heavy smoke is of great importance.

The use of oil by various railroads for locomotive fuel is common in Western States. Many stationary power plants, both large and small units, are rapidly adopting internal combustion engines for prime movers. These engines, including the Diesel type, are dependent solely upon petroleum for fuel.

It does not take the trained mind of an engineer to realize that burning of crude oil or residuum in competition with coal under boilers to produce steam is a wasteful and an uneconomical way of utilizing this valuable natural resource, as the future supplies of coal, when compared with petroleum, appear almost inexhaustible.

The progressively extending uses of pertroleum and its products will, in a short time, make it necessary to look for possible substitutes for the less economic uses of petroleum.

Attention cannot be too strongly called to the fact that in the present utilization of petroleum practically 75 per cent. is wastefully utilized.

While considering the crude oil, as a diversion it may be said that some of the heavier crude oils and the residuum products of these, including tars, constitute a factor of great importance in the construction and maintenance of good roads throughout the various States. That industrial development and progress accompany the advent of better highways is not a debatable question nor a modern idea, for civilization has known of it and profited by that knowledge throughout the ages, as most good roads of the ancients were for military purposes. The present decade has witnessed a greatly increased interest in this subject in the United States, and county, State and national highways costing millions upon millions of dollars are being constructed from the Atlantic to the Pacific. It is true that motor-driven vehicles are largely responsible for this desire for good roads, but they in turn are made possible only because of products of petroleum, gasoline for fuel and oils for lubrication.

Gasoline and Its Utilization.

When crude petroleum is refined, the first product distilled is gasoline. Gasoline, because of its votality and its resultant adaptability for use in internal combustion engines, has been the all-important factor in the development of the automobile, the power boat, the farm tractor, the heavier-than-air flying machine. This field, broad as it seems to the layman, is expanding every day until nearly every phase of traction used by man, for work or pleasure, is being invaded by gasoline-driven motors, including all types of farm implements and forms of truckse or wagons. In addition we learn from the terrible lesson now being taught the world in Europe that gasoline is almost a necessity for our national security. In fact, in the early stages of the war an eminent writer said that this war was to be won or lost on gasoline.

Necessity is the forerunner of more efficient utilization. When the supply of gasoline was threatened the Standard Oil Company, realizing the necessity of increasing the amount of gasoline that could be derived from a given amount of crude oil, developed a successful cracking process by which it is estimated that 5,000,000 barrels of gasoline was manufactured during 1916 from oils that heretofore were used in the manufacture of artificial gas or in direct competition with coal.

In continuing the process of distillation, after the gasoline, kerosene is produced. We are prone to think of this once very necessary article as being out of date. However, automobile engineers are now striving to improve their engines and carburetors so that more of this product can be used in automobile engines. Many millions of people, especially in the Far East, continue to utilize kerosene for lighting and heating.

In addition to the more widely known methods of utilizing petroleum products for heating and lighting purposes, more than three-fourths of the artificial gas delivered for city use in the United States is made from or enriched by petroleum.

The fact that all lines of human endeavor are dependent in some measure on some form of lubrication further demonstrates the wonderful limits of usefulness obtainable from this series of petroleum products. No one who has not made a study of the subject can begin to comprehend the many and various ways in which petroleum products serve to make things possible.

Petroleum Products in Manufacture.

The uses to which the products of petroleum are put in manufacturing industries are too numerous to list. They are being increased every day, and new industries are being made possible by the introduction of various by-products. Some of the more common uses of the different products of petroleum include:—Several types of roofing materials; various types of insulating products for use in electrical work; fillers for automobie tires, manufacture of inks, dyes and paint bodies; manufacture of explosives, turpentine substitutes, manufacture of soaps, manufacture of insecticides, medicinal purposes and many other uses. Nearly every phase of life's work calls for some use of a lubricating medium, and petroleum products fill an ever increasing mission in smoothing life's work and accomplishments.

To more vividly call your attention to the seemingly indefinite number of avenues of utility open to petroleum products, a partial list may be given of the uses made of one product—paraffin, to wit:—

Manufacture of candles; a sealing medium for making jars and bottles air tight; waterproofing paper wrappers; waterproofing matches; saturation of matches to facilitate combustion; waterproofing certain fabrics; as a body or filler for many floor and furniture polishes, and as a protection tion against weathering.

Now that the importance of our petroleum resources has been roughly indicated, let us see how this great natural resource is being utilized. In the first place, the U. S. Geological Survey has estimated—

That at the present rate of consumption, the total petroleum resources of this country discovered and undiscovered will last only in the neighborhood of twenty-seven years. And it must be remembered that the consumption is constantly increasing.

It is estimated that our production methods leave more than 50 per cent. of the oil in the sands, and in some cases possibly as little as 10 per cent. of the oil is recovered from the producing sand. Clearly there is room for improvement.

But 30 Per Cent. Used Efficiently.

Of our petroleum actually produced, we are today using not more than 30 per cent. efficiently, that is for motor and lubricating purposes. The other 70 per cent. is used in competition with coal, burned under boilers, or exported to foreign countries and sold for less than actual cost. The great problem now before the petroleum industry is two-fold. First, to increase the percentage of crude oil recovered from the underground reservoirs where it has been stored by nature, and second, to utilize more efficiently the oil that is produced.

The Bureau of Mines, with the limited means at its disposal, is now engaged on both of these problems, which are of such vital importance both to the petroleum industry and to the general public, since our industrial expansion as well as our national defense is dependent upon our petroleum resources. By studies of drilling methods and by offering technical advice to the operators the bureau hopes to solve the first problem, and by the introduction of an efficient cracking process it hopes to increase the gasoline production from the present supply of crude, and thus take a long step toward the solution of the second problem. These investigations inure to the benefit of the public as well as to the petroleum industry, because the general public in the end must pay for the losses and wastes which, if permitted to continue, must prematurely deplete one of our most necessary natural resources.

As an incentive for such efforts on the part of the Bureau of Mines, it is safe to say that with the present available information, the production of gasoline and lubricating oils from a given amount of many crudes should be increased 100 per cent.

VAN. H. MANNING,

Director, United States Bureau of Mines.

Van. H. Manning, Director of the United States Bureau of Mines, was born at Horn Lake Depot, Miss., December 15, 1861. His father was Vannoy H. Manning, Sr., who represented the second Mississippi district in Congress. Mr. Manning holds the degree of A. B. from the University of Mississippi.

Mr. Manning is a member of the American Institute of Mining Engineers; Washington Society of Engineers; Cosmos Club (an organization of scientific men in the government services at Washington); National Geographical Society; Delta Kappa Epsilon; Twenty Years' Topographers (an organization of United States Geological Survey employes); vice-president of the Home Club of Washington; American Mining Congress; Trowel Club (Masonic), and Mississippi Society of Washington. He is the author of a large number of topographic maps of various portions of the United States; of Bulletin No. 76 of the Bureau of Mines, "United States Coals Available for Export Trade," a report issued in the fall of 1914, with a view of assisting the American coal-mining industry in developing a coal-exporting trade, with especial reference to Latin-American countries; and of Bulletin No. 141, "The Work of the Bureau of Mines."

For more than twenty years Mr. Manning has been engaged in technical and scientific work under the Department of the Interior. From 1885 to 1910 he served as engineer with the United States Geological Survey, engaged in topographic mapping in nearly every State in the Union. In addition to scientific work, he has long held administrative positions in the government service.

When the Bureau of Mines was established in 1910, Mr. Manning was appointed to an administrative position in the bureau by Secretary Ballinger, and, on January 1, 1911, was made assistant director. He became acting director of the bureau in immediate charge of its work January 1, 1914, at which time Dr. Holmes, on account of illness, relinquished active work as director.

During his service with the bureau, Mr. Manning has had charge of methods relating to appointments, expenditures and the conduct of investigations.

After June 1, 1914, when Dr. Holmes was obliged by failing health to relinquish his duties, Mr. Manning had charge of all the technological investigations conducted by the bureau, of the operation of its mine-rescue cars and stations, and of the educational work of safety and health that the bureau is conducting in the mining and metallurgical districts of the United States. Mr. Manning was appointed director of the Bureau of Mines on August 25, 1915.

INCREASING THE PRODUCTION OF COTTONSEED OIL THROUGH SEED SELECTION AND THE USE OF DISEASE-RESISTING STRAINS.

By ANDREW M. SOULE, President, Georgia State Agricultural College.

FOR many years cotton was grown solely for the lint. In the early history of the industry the seeds were regarded as a nuisance, and were often allowed to accumulate around the gin house or were thrown into streams in the hope that the next freshet would carry them away and so save the owner any further trouble in disposing of them. Their fertilizing value was not even appreciated. No doubt this was due to the fact that chemistry was still in its infancy and the chemist as a potent factor in our industrial life still unrecognized. Later the seed were used almost exclusively for fertilizing purposes, and then upon the establishment of the oil mill and the discovery that a large quantity of very fine oil could be expressed therefrom, the farmer came to appreciate that it was good practice for him to sell his seed to the oil mill or at least exchange them for meal which he could use either for feed or fertilizer.

The prediction made a few years ago by the writer that cottonseed would soon become of primary importance to the industrial life of the South has been suddenly fulfilled, and the time has now come when the seed have assumed a potential economic importance which they are destined to maintain in the future. The time has also definitely arrived when the farmer must dispose of them to the oil mill, as it is utterly impossible for him to keep them at home and use them directly either as food or fertilizer and secure therefrom anything like the value which can be obtained from selling them to the oil mill at prices ranging from $50 to $65 a ton.

Oil of No Value as Fertilizer.

It was long since established that the oil in cottonseed, consisting as it does of carbon, hydrogen and oxygen, was of no value for fertilizing purposes and that it was a serious economic mistake to return such an important food product directly to the soil. The value of oil in view of the recent high prices of all foodstuffs has become greatly enhanced, and it is almost daily being put to some new use in art or industry or for the sustenance of human beings. With the advent of the high prices which are now prevailing, the oil miller has suddenly found himself confronted with the fact that he cannot hope to pay the prices now prevailing for the raw material and succeed as a manufacturer unless he can obtain a seed of uniform grade and which will yield not only a high per cent of oil, but a high per cent of nitrogen as well, thereby increasing his revenue from the sale of oil and concentrated feed, whether it be used for the sustenance of animals or for fertilizing purposes.

A few years ago when seed commanded a lower price and the relatively crude processes followed in the oil mill still enabled the owner to secure a fair return on his investment, no attention was paid to the composition of the seed, hence it is only comparatively recently that the wide variation in the composition of seed as to its content of oil and nitrogen has been seriously considered. Now, it is a well-established fact that in some localities one mill may secure a return of four gallons or more per ton from its crush in excess of a mill located possibly not over ten miles distant.

Variation in Oil Content.

It has now been well established, for instance, that there is a possible variation in the oil content of varieties of cotton in extreme cases of as much as fifteen gallons per ton, and a difference in nitrogen content equivalent to 27 pounds per ton of seed. According to these figures, with oil even at forty cents a gallon, the seed from some varieties would be worth $6.00 more per ton for crushing purposes than that obtained from other varieties. But even if it be only possible on a practical basis, and this seems feasible, to increase the oil content by five gallons per ton through planting certain standard, selected and improved strain of cotton, this would add to the value of the seed crushed at present on the basis of the price mentioned above not far from ten million dollars a year. As oil commands a much higher price than forty cents a gallon, the actual increase would be far in excess of the amount indicated. As already pointed out, there is a possible difference of 27 pounds of nitrogen per ton of seed, which at 20 cents a pound for organic nitrogen would represent a variation in the crushing value of $5.40 per ton. Since we crush about five million tons of seed annually, the saving effected by the growth of certain strains bred for high nitrogen yield would be equivalent to $25,000,000 a year.

This will give some idea of the importance of studying the composition of cottonseed and selecting for planting certain varieties which run high in nitrogen and oil content, providing the desirable qualities of high lint yield and earliness can be preserved. Of course, there is much natural variation in varieties. There are a few strains of cotton now grown extensively in the South which might with propriety be regarded as fairly standard sorts and which are adapted apparently for growth over wide sections of the country. There are hundreds of other so-called varieties that really are not standard, and have only a local value. There are many other so-called varieties derived from standard sorts given names by unscrupulous persons which should not be permitted to be sold and used for seed because of their lack of desirable qualities and the fact that they can only be grown at a considerable loss to the farmer, the manufacturer and the ultimate consumer as well.

The differences shown in the nitrogen and oil content of some varieties, which are quite extensively cultivated, are nicely illustrated in the table which follows, which shows the percentage of hulls, percentage of oil, gallons of oil per ton of seed, percentage of nitrogen in the seed, and the pounds of nitrogen in meats per ton of seed.

Amount of Oil and Nitrogen in Different Varieties.

Variety.	Per cent. of hulls.	Per cent. of oil.	Gallons of oil per ton of seed.	Per cent. of nitrogen in seed.	Lbs. of nitrogen in meats per ton of seed.
Poulnot	41.83	23.64	63.04	2.99	59.08
Sunbeam 51....	40.61	23.15	61.73	3.18	63.68
Rexall	56.36	22.37	59.65	2.84	56.80
Sunbeam 26....	40.63	22.27	59.38	3.43	69.00
Cook's	55.74	21.81	56.16	2.99	59.90
Culpepper's	55.63	21.76	58.02	2.57	51.50
Bramblett's	54.85	21.18	56.48	2.09	42.00
Texas Burr.....	44.78	21.10	56.30	2.73	54.70
Brown's No. 1..	53.65	20.58	54.88	2.42	48.40
Christopher	46.18	20.47	54.58	2.80	56.00
Hite's Early.. .	59.40	20.41	54.41	3.22	64.46
Long Shank....	47.74	20.36	54.30	2.91	58.30
Willett's Ideal..	52.03	20.29	54.10	2.88	57.70
Langford's	52.26	18.15	49.36	2.31	46.32

Notice that the percentage of hulls varied from 40.61 with Sunbeam strain 51 to 59.4 with Hite's Early. The oil content varied from 18.51 with Langford's to 23.64 with Poulnot. The calculation shows Langford's to contain 49.36 gallons of oil per ton, while Poulnot contains 63.04 gallons. In this connection you will observe that strain No. 51 of Sunbeam contained practically 62 gallons of oil per ton, and strain 26 of Sunbeam 59.38 gallons. There is thus a difference shown here between Langford's and Poulnot of 13.68 gallons of oil per ton. In sections of Georgia, where Langford's and Poulnot are largely grown, complaint has been made to the writer by the oil mil's that there was a great difference in the actual amount of oil obtained from the seed crushed in the territory tributary to the mills in question. This table illustrates why this difference occurs, and would indicate that the strain or variety grown has much to do with the percentage of oil derived from the seed, when it is crushed. Presuming that the average oil content of cotton seed runs from 52 to 54 gallons per ton, some of the strains with which we are working appear to be capable of yielding ten gallons more of crude oil per ton of seed than is now obtained.

Relation of Oil Content and Yields.

A question which naturally arises in this connection is the possibility of correlating desirable characters. It has been thought by many, who have not investigated the question, that high oil content and earliness could probably not be secured in the same variety. It seems evident, however, from work which has been carried on for several years past, that there is a definite correlation between high oil content and earliness and satisfactory yields. This is a very important matter and will certainly exert a material influence on the selection of planting seed in the immediate future. As in all instances, nature has thus through a wise provision provided for the changes which the boll weevil is forcing upon us through necessitating the selection of early maturing varieties for planting.

ANDREW M. SOULE, B.S.A.; SC.D.; F. R. S. A., LL. D.

President, Georgia State College of Agriculture and the Mechanic Arts.

Andrew M. Soule was born near Hamilton, Ontario, Canada, and prepared for college in the primary and secondary schools at Niagara Falls, Canada. He received an associate diploma from Ontario Agricultural College in 1892, and was graduated from the University of Toronto in 1893 with the degree of B. S. A. In 1894 he was assistant to the director of Missouri Experiment Station. From 1894 to 1899 he was assistant professor of agriculture at the Texas Agricultural College. From 1899 to 1904 he was director of the Tennessee Experiment Station and chairman of agricultural faculty, from 1904 to 1907 dean and director of the Virginia Experiment Station and College of Agriculture.

Since 1907 Mr. Soule has been president of the Georgia State College of Agriculture and the Mechanic Arts.

Dr. Soule had the degree of Sc. D. conferred on him by the University of Georgia in 1911, and the degree of LL. D. by the same institution in 1916. He was chosen a fellow of the Royal Society of Arts of London, England, in 1915. He has traveled extensively both in America and Europe. He is ex-president of the American Association of Farmers' Institute Workers; ex-vice-president of the Association of American Agricultural Colleges and Experiment Stations; a member of the Association for the Advancement of Science, the National Geographic Society, the Board of Directors of the Georgia Experiment Station, and the Association of American Agricultural Colleges and Experiment Stations. He is the author of a book on "Agriculture: Its Fundamental Principals," and of numerous bulletins and monographs on agricultural subjects.

It is not essential or desirable at this juncture to discuss the mysterious manner in which nature provides for the co-ordination of the very desirable qualities of earliness, high percentage of lint, large yields and high oil content. That she does so is nicely illustrated by the data presented in Table No. 1.

College No. 1 is a strain of cotton developed through a system of plant breeding inaugurated at the College of Agriculture several years ago. It will be observed that the seed of College No. 1 planted in 1915 contained 21.17 per cent. of oil. The yield from the first picking was 789 pounds; from the second picking, 812 pounds; from third picking, 704 pounds; and from the fourth picking, 717 pounds. The total yield of seed cotton with this variety was therefore 3,119 pounds per acre. Culpepper's, another variety, showed an oil content of 21.1 per cent. of oil and also made a very good yield, though it was later maturing than College No. 1. Williams contained 20.33 per cent. of oil, but did not yield quite so well as Culpepper's. Brown's No. 2 contained 19.75 per cent. of oil, but did not yield quite so well as Williams. Coming down to Meadow's and Langford's, the latter of which only contained 17.38 per cent. of oil, the yields are lower and the quality of earliness not especially accentuated. The reader will observe that there is a difference of nearly 4 per cent. between the oil content of College No. 1 and Langford's, that the latter is not so early and that it does not yield so well. (See Table No. 2.)

In further proof of the correlation indicated, we note that when selections of College No. 1 were planted by themselves in 1916 those showing the highest oil content were also the earliest and made the largest total yield. It will be observed that certain strains of College No. 1 ran comparatively low in oil. These, of course, are the ones which will be discarded. It is impossible to tell from looking at a plant what the composition of the seed may be, but when you make an actual test and determine in the laboratory the oil content, keep a record of the different pickings and the percentage of lint, it is then possible to select out of the thousands of hybrids which must necessarily be produced to secure the proper correlation of the desirable qualities indicated that outstanding variety which has superior merit to those ordinarily grown. The farmer probably does not realize the slow, tedious and laborious work which must be done to improve the quality of a given strain of cotton. By reason of the lack of knowledge with regard to the principles of plant breeding we find any number of varieties of seed now on the market which are lacking in those fundamental characters which a high standard variety of cotton should possess, and yet are purchased at high prices and used generally by our farmers.

Preparation of a Seed Map

These facts make it quite evident that a seed map of a given state would be a most valuable adjunct, not only to the farmer but to the manufacturer as well. In preparing such a map the state should be divided according to climatic and soil areas. This will not be such a difficult thing to do as might appear at first thought. Then all the varieties grown and which it is claimed have been selected and handled with some care by the producers should be investigated and studied at first hand, that the characteristics of the plants as they grow in the field, their resistance to disease, and their early maturing qualities may be ascertained. The method of selecting the seed and the care with which they are ginned and handled should also be ascertained. Then the oil and nitrogen content of the seed should be determined. By this means varieties that are well established and have a wide adaptability can be determined, as well as those which are well suited to certain soil or climatic areas. Thus, the first step becomes possible in the elimination of the growth of the large number of unsatisfactory sorts which are cultivated and sold purely for mercenary purposes by many individuals, who have no conception of the first principles of plant breeding and are only in the business because of its lucrative nature. It is now well established, for instance, that certain varieties of cotton are strongly resistant to the wilt disease. Others which are equally good in territory not infested by this fungus would prove worthless in infested territory. With some varieties fifty per cent. of the bolls may be destroyed by anthracnose. It is criminal to permit such a variety to be grown and widely distributed even if it has some good qualities, because when this fungus becomes established in the soil it will maintain itself there for years and will destroy succeeding crops of

cotton unless some strain highly resistant to it be secured.

Georgia at Work on Such a Map.

A seed map of the character indicated is now in the course of preparation for the state of Georgia. It will take several months to complete it, but when finished it is believed that it will present the first definite data with reference to the amount and kind of planting seed being produced within the confines of a given state. It will show the varieties being grown and offered for sale as seed, the quantity produced and the extent to which it is cultivated. It is believed that when this map is completed and the oil and nitrogen content of all the varieties in question ascertained that it will be found that a considerable number of varieties are being grown which do not advantage the farmer in any sense, and cannot be handled with profit and success by the oil mills.

The need of standardizing varieties is thus self-evident, and need not be dwelt on in any considerable detail at the present time.

In this connection it will be interesting to present the record of six varieties in so far as the oil content is concerned as grown in the demonstration field of the State College of Agriculture at Athens during the years 1914, 1915 and 1916. (See Table No. 3.)

It will be observed that Rexall shows an average oil content for the three years in question of 23.28 per cent.; Hite's 22.57 per cent.; Willet's Ideal 21.89 per cent.; Brown's No. 1, 21.94 per cent.; and Brown's No. 1 and Culpepper's of more than 20 per cent. In tests made at Athens Rexall has not shown up well as to yield or earliness; therefore its general cultivation cannot be recommended; and it stands self-condemned unless the factors of yield and earliness can be changed in a satisfactory manner. Hite's, on the other hand, while running high in oil content, seems to be better adapted to sections of east Georgia than to other parts of the state and the same is true of Willet's Ideal. Cook's, on the other hand, seems to have a wide adaptability for cultivation in practically all parts of the state, though rather subject to anthracnose.

Possibilities of Standardization.

It is only by making these intimate studies of the various characteristics of cotton with the aid of the chemist, the field demonstration plant, and a seed map of the state that it will be possible to standardize varieties in a satisfactory degree and secure that desirable correlation of characteristics which will make these varieties of permanent value to all the interests concerned. The need of selection for disease resistance has already been noted. Millions of dollars are lost each year to growers and manufacturers as well by reason of a failure to plant resistant varieties. It is, of course, only a matter of a short time until all the cotton growing area will be infested by the weevil, which means that early maturity becomes a matter of concern to every one. Fortunately, a number of standard varieties possess this quality and it can be emphasized through the use of large quantities of acid phosphate and a sufficient amount of nitrogen to insure the rapid growth and development and fruiting of the cotton plant. Thus, cultivation and fertilization will play an important and determining part in the results obtained through seed selection for the purpose of increasing the oil and nitrogen content.

To-day we stand at the threshold of knowledge so far as the latent possibilities of cotton improvement through seed selection are concerned. We know enough to realize that unlimited opportunities lie before us in the direction indicated, and it is believed that it will prove such an alluring field to the investigator that results of vast economic importance to Southern agriculture will soon be obtained through the united co-operative effort of the farmer, the oil miller, the plant breeder, the chemist, and the commonwealths having in charge the destinies of our agricultural colleges and which through the appropriations accorded these institutions are to determine the rate of progress which we will make in this fundamental work.

TABLE NO. 1.

Results with Different Varieties, 1915.

Variety.	Per cent. of oil.	Pounds 1st picking.	2d picking.	3d picking.	4th picking.	Yield of seed cotton
College No. 1	21.17	789	812	704	717	3,119
Culpepper's	21.10	443	605	804	1,089	2,941
William's	20.33	477	608	735	967	2,784
Brown's No. 2	19.75	567	603	807	680	2,747
Meadow's	19.21	499	803	684	712	2,698
Langford's	17.38	460	733	750	703	2,645

TABLE NO. 2.

Seed Selection with College No. 1, 1916.

Strain No.	Per cent. of oil.	Pounds 1st picking.	2d picking.	3d picking.	4th picking.	5th picking.	Yield of seed cotton
7-2-1	21.07	1,062	595	467	170	255	2,549
7-3-2	19.90	1,062	425	220	205	380	2,292
2-1	19.40	268	518	588	374	294	2,044
1-2	18.62	302	532	514	336	224	1,998

TABLE NO. 3.

Per Cent. of Oil in Cotton seed on Green Seed Basis.

Variety.	1914.	1915.	1916.	Average for three years.
Rexall	23.67	23.25	22.93	23.28
Hite's	23.24	22.48	21.99	22.57
Willet's Ideal	22.67	21.65	21.37	21.89
Cook's	22.04	21.52	22.27	21.94
Brown's No. 1	21.17	19.73	21.67	20.85
Culpepper's	21.10	19.15	20.96	20.40

THE BARIUM CHEMICAL INDUSTRY AND ITS PRODUCTS, AND THE POSSIBILITIES INHERENT IN OUR VAST DEPOSITS OF BARYTES.

By MAXIMILIAN TOCH, Chemist and Author.

THE barium industry in the United States must not be confounded with the barytes industry. The barytes industry has existed in the United States for many years and consisted only of the grading of barite ore and powdering it for paint and other purposes. This material has been known as barytes, and has been largely used as a paint filler and as an adulterant in the manufacture of cheap and imitation white leads. On the Eastern coast of the United States German barytes competed very successfully with the American product, so that the Missouri fields did not produce any very large tonnage, and could only sell where inland freights permitted.

The barium industry, however, is the chemical industry involved in the manufacture of the barium salts from barytes, and three times prior to the great European war was this industry attempted in the United States without commercial success. At the same time, fairly large quantities of barium ore were used in the barium industry for the manufacture of lithopone, but no direct barium salts had ever been successfully made on a commercial scale until the war, and with reasonable protection and sufficient skill the industry ought to be permanent in the United States.

The credit for the manufacture of barium chemicals out of barite in America should by all means go to W. D. Gilman, Sr., who really worked out the process for the reduction of the ore on a commercial scale. What my firm did after the reduction of the ore was to devise a means for the manufacture of pure precipitated barium sulphate, barium nitrate and chloride from the sulphide, but simple as it may be in a laboratory to make barium salts from barium sulphide, I can attest to the fact that when it comes to turning out 20 or 30 tons of material a day of pure material the tasks presented are herculean and the amount of research involved is tremendous.

Methods of Production.

Briefly stated, barite is the natural barium sulphate, and when this is mixed with coal in proper proportions and heated to a temperature of about 2,100 degrees F., the oxygen and coal go off and barium sulphide is left. In the beginning we were glad to obtain a 65 per cent. barium sulphide yield, but with the new and improved type of furnaces as high as 85 per cent. can be easily obtained. The ore, of course, has much to do with this, for ore which contains iron either in the form of ocher or hematite has a bad habit of baffling the reaction. Ore which contains an appreciable percentage of fluorine is very dangerous, for if the amount is small it clinkers itself to the lining of the furnace, and if the amount is large it fluxes. These are all problems which were unknown in America, and one of the first things that my firm did was to purchase mines of approved quality, and I can very safely say that the ore in the neighborhood of Sweetwater, Tenn., is equal in every respect to the best ore of Germany.

We have installed fine modern mining equipment and washers, but the most fortunate part of the Tennessee district is that all the ore is above ground, and to quote the report of one of the best known chemists in the United States in reference to one of our group of mines, "If we take out from one of our mines 100 tons of ore a day it will be sixty years before we ever reach tidewater."

It may be interesting to note that all the goods turned out in America from high grade ore are a credit to the chemical industry in the United States. German carbonate, for instance, was largely sold on a basis of 97 to 98 per cent. barium carbonate. Ours is sold on the same basis, but frequent analysis shows it to run from 98 to 99 and frequently as high as 99.5.

Changes in Last Decade.

Ten years ago the artificial barium sulphate, which is known as Lake Base or Dry Blanc Fixe, was hardly known in America as a paint material, yet to-day it is used by many industries, particularly in the manufacture of hign grade enamels and good wearing paints, for there is no doubt about it that it increases the life of a paint, and gives a much more uniform gloss where gloss is desired. Times change and with it our opinions. Ten years ago the addition of 45 per cent. barium sulphate to any paint was regarded as an adulterant. To-day that is the standard formula of the United States Navy, and the question of adulteration does not enter, for it is found that the life of the paint is largely increased and its appearance is correspondingly improved.

The manufacture of barium chloride in tre United States is not conducted on as large a scale as it should, for the unfortunate reason that with perhaps one exception only one barium manufacturer has a hydrochloric acid plant, and the transportation of hydrochloric acid is rather expensive.

Could Take a Hint From Germany.

It is a very unfortunate thing that our lawmakers are not scientifically trained men. I hold no brief for any of the warring countries, but surely we ought to take a leaf out of Germany's book, and then we will read why Germany has been such a successful commercial country before the war. Germany owns all the railroads, and controls all of the steamship lines. Germany encourages trusts, combinations and trade selling agreements. If I were to philosophize a moment I would say that morals is a question of geography. If a captain of industry in Germany is permitted to make a great succes sby means of methods I have just mentioned, he not only becomes a rich man, but in addition he is probably given a baronetcy or some high commercial title. In the United States if he attempts to make a success by means of a combination or a trade agreement the Sherman law is invoked, and he might not only lose all of his money, but be put in prison besides, and nobody in America is the gainer, in fact, all concerned are losers, because the consumer may not even feel or know of the slight amount of money that he may have saved.

It is just exactly like the question of

MAXIMILIAN TOCH.

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Maximilian Toch, the writer of the special articles herewith, is well known as an author and lecturer on applied chemistry, with particular reference to the point and varnish industry. He is a graduate and post-graduate of New York University, and a former lecturer on applied chemistry at the Columbia University College of Pharmacy. He is a member of the American Association for Advancement of Science, American Chemical Society, American Electrochemical Society, American Institute of Chemical Engineers, American Institute of Mining Engineers, American Society of Civil Engineers, American Society for Testing Materials, American Society of Brewing Technology, Chemical Society of London, Deutsche Chemische Gesellschaft, Franklin Institute of State of Pennsylvania, Paint and Varnish Society of London, England, Society of Chemical Industry, New York Section (Past Chairman); Society of Chemistry of England (American vice-president); Verein Deutscher Chemiker, President of section on "Paints and Varnishes" of the Eighth International Congress of Applied Chemistry, New York city, 1908; United States delegate and representative to Seventh International Congress of Applied Chemistry, Berlin, Germany, 1903; former lecturer on "Applied Chemistry," Columbia University, College of Pharmacy, New York; past president of Chemists' Club, New York city; member of Paint and Chemical Manufacturing Concern of Toch Brothers; chemical director and treasurer of Durex Chemical Corporation, and the author of "The Chemistry and Technology of Paints," "Materials for Permanent Painting," etc.

sea beach bathing. If a woman on the Jersey coast should wear an abbreviated or clinging bathing dress she may be arrested on the ground of immorality, but the shorter and more clinging the bathing dress at Ostend or Trouville the greater the attraction, and the greater the praise; and still further when the natives of the Solomon Islands go bathing they wear their "birthday clothes," and the question of morality or immorality does not enter. So it is plainly evident that morals is a question of geography.

If our lawmakers could view the commercial relations of the United States with other countries in an analagous light they would permit us to form reasonable combinations, give us "anti-dumping" laws that are real laws, like the Japanese have, and while I am asking no subsidy they should give us protection for the infant industries of the United States, which for the next few years are going to be the chemical industries.

All of this leads me to the statement that a German miner or chemical manufacturer can go to his Government, and in twenty-four hours obtain a ruling which will give him a kind of subsidy to enable him to compete; as for instance, he will obtain a freight rate for barium ore from an inland station to a port on the east coast of the United States, at a rate of $1.80 per ton, and owing to economic conditions, which must be figured with under all circumstances, the lowest freight rate which can be obtained, say from Cartersville or Tenessee, to the cost would be $4 per ton, so that Germany already has the advantage in the shipment of ore to the east coast of the United States. To quote another example, some years ago it was attempted to make barium carbonate in the United States. Immediately the German manufacturers delivered barium carbonate to the consumer in this country at about $5 per ton less than the American goods.

It is sincerely to be hoped that the Tariff Commission to be appointed by President Wilson will go into these subjects very thoroughly and rapidly, and give such protection to the manufacturer of American chemicals as will insure the life of the industry.

GREASING THE WAY OF AMERICAN INDUSTRIAL PROGRESS.

Changes Effected and to Be Desired in the Production and Marketing of Lubricating Greases.

By A. J. CALLAGHAN, American Oil Corporation.

DARWIN remarks somewhere that the longer he lived and the more he learned about life, the less he felt he knew about it. If I may be permitted, I would parody that, and make it apply to the grease business.

When I first started in the lubricating business a number of years ago my attention was more given to lubricating oil, because at that time grease had not reached its present perfection. At that period the consistencies, say in cup grease, were hardly standardized in any way. There was not the close line of demarcation that exists to-day between the different grades and consistencies.

Later, more particular attention to the grease business was necessary on account of the rapidly increasing number of automobiles, which created a very large and desirable market for greases. It soon became apparent that the ordinary grade of cup grease would have to be made more uniform and that more attention would be paid to the consistency. After experiments I came to realize that as far as the lubrication of automobile transmissions and differentials were concerned the lighter grades of cup grease for transmissions were not the most satisfactory nor efficient lubricants. Development along this line of thought has brought out, through a number of the manufacturers in the United States, various greases, which are much more desirable than the lighter numbers of cup, or transmission grease, as they were called, for this purpose, and this has extended until there is almost a special grease for every different part of the automobile.

The Development of Compounds.

Our company has been very successful in its development of compounds, but there is not the slightest doubt in my mind that to-day the user has been greatly benefited through this development, inasmuch as he now obtains a far more economical and efficient lubricant for his automobile than he could a few years ago. Of course, the demand by automobile users is a large part of the outlet for grease, but factory lubrication also calls for a great deal of attention from the grease end of the business, and the greases are being developed for particular uses under certain conditions, so that to-day looking all over the field, I think that lubricating grease is being used more and more in places where oil previously was used.

We head this article, "Greasing the Way of American Industrial Progress," and the development of grease has been of benefit to all classes of machinery because by their more particular and proper lubrication great expense has been saved, and the efficient results obtained, making the life of the machinery longer, and making it work more smoothly, turning out more work, and in this way benefiting the owner or company, or the automobile user, who finds that his automobile has longer life than heretofore.

In the production end of the grease business, the same development can be noticed in the process of manufacturing, and the standardization of the consistencies, and in the multiplication of the greases and new compounds.

To-day the grease manufacturer is able to build up a special grease for practically any special requirement. Through our extensive advertising to the trade, we are daily called upon for recommendations as to what should be used under certain conditions and after getting the details and learning all we can about the requirement, we find that we can adapt one of our present grades, or produce a new grade to meet that particular circumstance, or recommend an oil if this is thought best for the purpose.

In the marketing of greases more attention is being paid to quality to-day than ever before. The factory engineer is required by his employer to become something of an efficiency expert in the lubricating and running of the machinery so as to get the most power or work out of them. For this reason haphazard guessing at what is suitable for certain lubricating requirements has been practically eliminated.

Today, the engineer must decide on the most efficient grease; he has to pay attention to what he purchases, or what he indicates should be purchased, as most of the up-to-date factories keep close tab on the results obtained on the lubricants they purchase, and they are soon able to eliminate the grease that does not give the most economical and efficient results.

There is another phase of the question, of course, that comes up, and that is applying a particular grease to a particular purpose. Sometimes the wrong grade is chosen; sometimes the right grade is taken, but the wrong consistency. My close contact with the grease business, and wide experience gained, enables me to advise and suggest where to use this oil, or that grease, when the definite requirement or purpose, is indicated, and through our company's ability to assist in this matter, we find that it solves a great portion of our marketing problem, because after all, the buyer is to a great extent guided by what the manufacturer advises or suggests, and the buyer can soon check up and find out if the results are right or wrong.

On the subject of marketing, I believe that effective advertising, combined with strong personality, and of course, backed up by good quality products, and fair prices, will undoubtedly bring the reward in the feeling that you have a successful business; one that is progressing, and is constantly adding to its list of buyers.

The Effect of Personality.

I believe that in the oil and grease business today, especially amongst the independents, personality counts, in a very large measure, for the success they have attained. I mean by this, the personality of the head of the concern, and the personality of their salesmen who come in actual contact with the trade. Then, if the factory and office staff are efficient and handle the orders and get them out correctly, and as instructed by the salesmen, the buyer is bound to be satisfied, and his repeat orders are bound to come along. He is not inclined to go shopping around unless he feels that some particular thing is not right; that he is being imposed on when he will go out and endeavor to make new connections, but any well informed manager of a manufacturing concern today, knows that he cannot impose in any manner on the buyers, and continue in business very long.

I feel that the outlook for the lubricating grease business in the United States and abroad, is very bright. New uses are being developed daily, for which grease or compounds in some grade or consistency can be used. Such new uses, increase with the development of all kinds of specialized machinery. Industrial progress is great and swift, and the progressive spirit shown by the grease manufacturers of the United States enables them to keep up with the demand for special requirement greases.

It is also a fact that in a great many cases an oil should be used instead of a grease and I always find it most satisfactory to myself and the buyer, that this be indicated whenever such a case occurs. This is what helps to build up a reputation for straight dealing, and I know that a company that has such a reputation, backed up by up-to-date manufacturing methods; production of good quality lubricants; marketing at fair prices, makes good with the buyer, and he becomes a regular customer and remains with you because you have established the greatest thing of all—confidence in the mind of the buyer.

Regarding changes to be desired in the marketing of lubricating greases, or solid oils, I do not know what I could pick out anything that I would care to see changed.

From my point of view, the business is an interesting one in its present stage. It gives fair returns for the time and money invested, and it brings you in contact with a fine bunch of fellows.

Market conditions have been very choatic for the last two years on account of the terrible conflict in Europe, and there is a great deal of uncertainty as to whether or not high prices will prevail after the war.

Looks for Shift After the War.

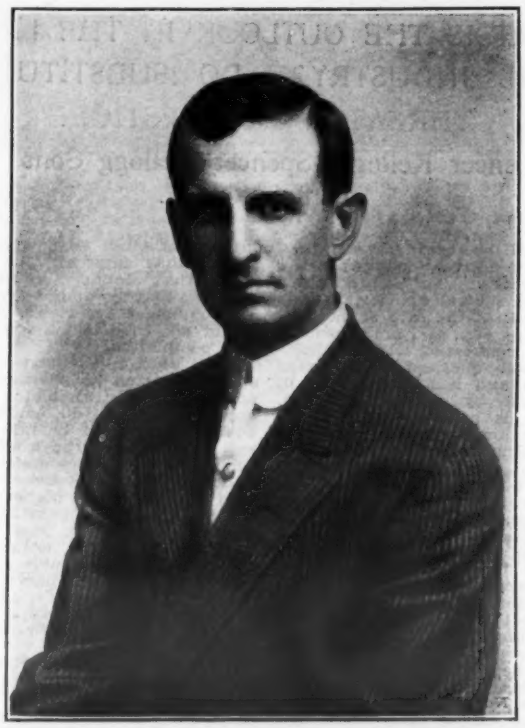
My opinion is that when peace is declared there will be a fair decline in prices for a few months and then prices will stiffen again because undoubtedly many of the European countries are today short of oils and fats and the big demand created will, of course, tend to higher prices, but I do not think at that time they will ever reach their present level.

In spite of the high prices today being paid for the finished products, I believe that most manufacturers find they do not have the margin of profit today that they have in normal times on account of the greatly increased costs in raw materials. The advance in the selling price of the finished article is not sufficient to make up the difference in the increased cost of production today. It is, therefore, up to the manufacturer to improve his methods of manufacture wherever practical, and in this way help to reduce the manufacturing cost, and thus recover a small portion of the lost profit.

The export field will take up more attention of the manufacturer in years to come. The increased demand all over the world for American prodcuts has, of course, been felt also by the manufacturers of grease. They are getting their greases introduced in the countries that formerly purchased such supplies from Europe. After the war European competition will start up again, but undoubtedly the United States manufacturers will be able to retain a good share of the business they now enjoy so that looking everything over, it would certainly appear that the demand for lubricating grease will continue to increase for many years to come.

In closing, I hope that the above covers the ground fully, and would state I will be glad at all times to discuss with anyone interested the many advantages of grease, and in fact any and all problems of lubrication.

A. J. CALLAGHAN.
American Oil Corporation.



A. J. Callaghan is one of the best known men in this country in the oil and grease business, as he has been connected with it from the first of his business life. He began as an office boy with the Cleveland Refining Company and has also worked for Scofield, Shurmer & Teagle and the Great Western Oil Company. On January 1, 1904, Mr. Callaghan organized the American Oil Company at Jackson, Mich., and started in a small way. In fact he was the only one on the payroll for five months.

In August, 1909, he organized the Advance Grease and Chemical Company, the name of which was later changed to the Advance Grease Company, and on January 1 of this year he organized the American Oil Corporation, which company absorbed both the American Oil Company and the Advance Grease Company. It caters principally to the jobbing and manufacturing trade.

Mr. Callaghan is 38 years of age and was born and educated in Cleveland, Ohio.

"Uniformity in Name and Specifications for Independent Lubricating Oil."

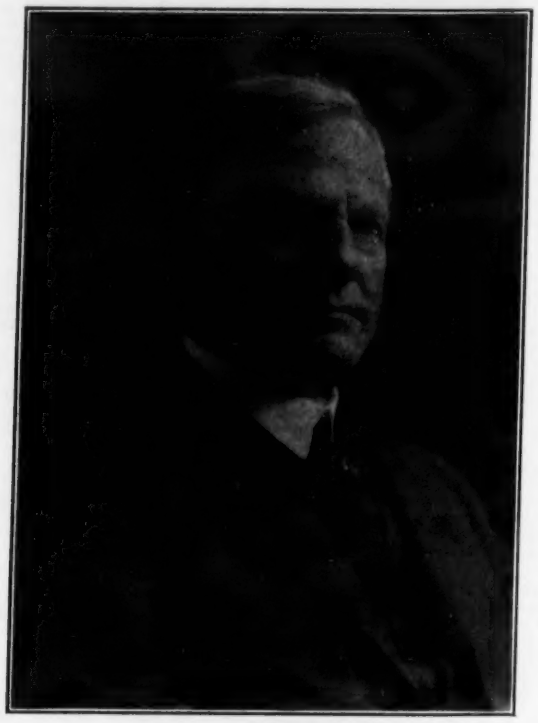
We are different from the companies who cover large areas of territory as a unit, says G. L. Sweeney, we are competing among ourselves in many territories, and we who have spent time and effort in advertising and pushing our own brands might hesitate to go into common causes where our individuality would be lost. On the other hand, there is no doubt that a uniform name would produce results, as, if sufficiently advertised, purchasers could be expected to ask for the independent brand if they felt that they could buy the goods wherever they might call for them. It is possible that a general name could be adopted to be used in conjunction with the individual brand of our various marketers.

We know that certain lubricants are made from Pennsylvania crudes by certain refineries, other manufacturers use Illinois crude, still others use Oklahoma, Texas or California crudes, and these crudes produce oils in which the specifications vary and tend to create confusion in the minds of not only the consumers, but the marketers themselves. There are certain specifications, however, which could probably be adopted which in a general way would fit the product manufacturers from these various crudes in the essential details.

A practice which is growing to considerable proportions is coming into use by many of the large manufacturers of recommending certain lubricants for the cars they make.

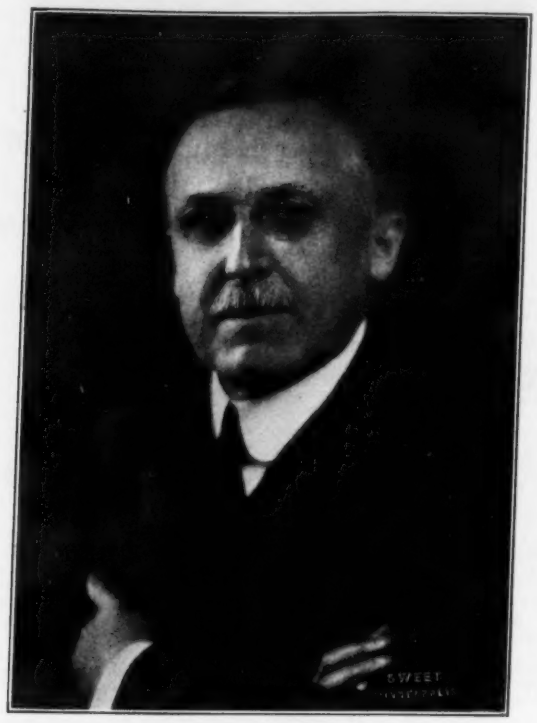
"WHAT IS THE OUTLOOK IN THE LINSEED OIL INDUSTRY?—DO SUBSTITUTES THREATEN ITS PRESTIGE?"

By JOHN W. DANIELS, Archer-Daniels Linseed Company, Minneapolis.



SPENCER KELLOGG.
Spencer Kellogg Sons & Co., Inc.

Spencer Kellogg, manufacturer, was born in West Galway, Saratoga county, New York, June 16, 1851. He was the son of Lauren and Elizabeth (Miller) Kellogg. He graduated from Gloversville (N. Y.) Seminary; studied under private tutors and entered the linseed oil business at Amsterdam, N. Y., in 1872. He was a private banker at Des Moines, Iowa, in 1878; manufacturer of linseed oil at Buffalo since 1879; and is now the largest individual manufacturer of linseed oil in the United States, with mills in Buffalo, Minneapolis, Superior, Wis., and New York city. Mr. Kellogg is also identified with the grain elevator business, is a manufacturer of brooms and brushes and white lead, paints, varnishes, etc. He was president of the New York State Steel Company, Buffalo, 1905-7; founder, 1911, and trustee Lincoln Memorial Hall, Hodgenville, Ky. He is a charter member of the National Marine League. His clubs include the Buffalo and Buffalo Country. He is the author of: "From Boyhood to Manhood," 1914; "A Capitalist's View of Socialism," 1916. His home is at 805 Delaware avenue and office, 98 Delaware avenue, Buffalo, N. Y.



JOHN W. DANIELS.
Archer-Daniels Linseed Company.

John W. Daniels was born in Piqua, Ohio. Graduated from the public schools he went into the linseed oil business in his native town when a very young man in 1879. He operated different linseed oil mills in Piqua, was director in two national banks and sold his interest in the linseed oil business in Piqua to the American Linseed Company in 1899. He then moved to Buffalo, N. Y., where he operated a mill for the American Linseed Company, but left Buffalo in 1901 and built a linseed oil mill for Sherwin-Williams at Cleveland in 1901. He moved to Minnesota in 1902, built a linseed mill at Minneapolis in connection with G. A. Archer, the firm being known as the Archer-Daniels Linseed Company. He has been president of above company since its organization. Mr. Daniels was president of the National Paint, Oil and Varnish Association in 1913. He married Amelia Leonard, of Piqua, Ohio, and had two sons, Forrest L. and Thomas L. Daniels, both graduates of Yale University.

I the flaxseed crop in the Northwestern States of this country. The total seed marketed that crop year in Minneapolis and Duluth was under ten million bushels. The price of seed advanced to very high levels, averaging well over $2.50 per bushel for the entire year. It was during that period that substitutes came into general use on a large scale. Linseed oil was selling at very high prices, and soya bean, fish oil, corn oil, China wood and other oils were all very cheap, selling at 40 to 50 per cent. of the linseed oil prices. This created great temptation to substitute or mix these cheaper oils with linseed oil. The use of these substitutes was large and reckless, and without due consideration for quality. The manufacturer only looked for the immediate gain and not for quality or reputation.

We are told by many men who used substitutes in 1910 and 1911 that the results obtained were not satisfactory, and that the trouble, annoyance and humiliation in many cases taught a lesson never to be forgotten.

Now that linseed oil is again on a very high plane, will the substitutes play as much of a figure as they did in 1910? We think not. In the first place past experience has shown that no oil will take the place of linseed oil for paint, varnish or linoleum. In the second place, the high price of all substitutes will not make the same temptation to mix or substitute other oil for linseed. A man might take a chance for 40 to 5$ per cent. profit, but when it comes to only 10 or 15 per cent. it is not worth the candle.

Before going into the causes for the high price of linseed oil I thought it wise to tell why I do not think substitutes "threaten the prestige" of same.

Situation One of Supply and Demand

Linseed oil is selling at very high prices, and its users want to satisfy themselves that the situation justifies the high prices being asked. It looks to me as though the present situation is largely one of supply and demand. The North American crop is probably eight to ten million bushels below what the country will consume, and the Argenuine crop is almost a complete failure, so much so that there is very little likelihood of any of it coming to the United States. The only other countries where there is any quantity of seed raised are India and Russia. The India seed cannot come here because the shipping conditions are almost impossible, and Europe can, and will, pay more than we can afford to pay.

As to the Russian crop, it is hard to find out anything about it, and the war makes it impossible to ship to any country.

The consuming powers of our country have never been so good as now. Like all neutral countries, we are very prosperous. Labor is employed more fully and at higher wages than have ever been paid in the history of the United States. Manufacturing, farming, mining and transportation are all thriving beyond anything ever experienced before. Iron, lead, copper, coal, zinc, wheat, cotton, corn, wool, leather are all selling at record prices, most of which has been the result of the war. Flaxseed, however, is high because of a world shortage. It would probably be higher if the war were to end suddenly, because Europe is bare of fats of all kinds, and stocks of linseed in the Central Powers are entirely exhausted, a fact which should create a demand that wou'd be hard to satisfy with the depleted stocks in the world at large.

The war has stopped practically all importations of linoleum and oil cloth, so that our home mills should have a much larger demand than usual. This will also add to the consumption of linseed oil in America.

With the present prosperity of the country the outlook is good for the linseed oil industry in 1917.

"WHAT IS THE OUTLOOK IN THE LINSEED OIL INDUSTRY? — DO SUBSTITUTES THREATEN ITS PRESTIGE?"

By Spencer Kellogg, Spencer Kellogg Sons & Co., Buffalo, N. Y.

t linseed oil business for the past t HAVE been actively engaged in the forty-five years. My grandfather manufactured several articles, including linseed oil, at the rate of twenty-five gallons per day, so I am informed.

During my connection with the business, the first question has always been present and has been solved in various ways by those interested. The outlook is good or bad in the same proportion as those connected with the business are good or bad business men. It is not enough that one should be a good manufacturer; he must also be a good merchant, for it is only occasionally nowadays that a profit can be made by one who has the faculty of running in an economical manner. This does not mean that one must speculate any more than do merchants, for they purchase before they sell. But it does mean that one must have that particular faculty to collect facts and assimilate those facts, and then have the courage of his convictions.

Outlook Not So Promising.

Just at the present time when seed is very near $3 per bushel, it requires more of a superior mind to make money than if the price was $1.25 per bushel, for at the present price one must be very coolheaded and conservative. Therefore, I would say that the outlook is not as good as it was last year for the majority of us. I take it for granted that no one would be so foolish as to give to the public his opinion of what his ideas are of the future, for often when one writes the things that impress him, there are those that doubt his honesty, and while he may be and is willing to give his customers his views, he certainly would not care to make them known to a competitor.

Your second question—"Do substitutes threaten its prestige?"—I think not, unless you can find an article as good as linseed oil, such as heavy bodied linseed oil or other oils that will dry and may be thinned so that they will make more material or more gallons; also the price of substitutes is proportionately higher; and still, again, I have not been able to make up my mind in the past that substitutes were much of a factor. Generally when substitutes are talked about, it is in years like this when we think oil will be very scarce and is high in price, but in some way we get through the year and nothing serious happens.

Margin Closer Than Ever Before.

I should say, summing up the situation, that the year will be a fairly good one for those manufacturing linseed oil, although I believe that never before in the history of the business has the margin been so close. Possibly this may be somewhat accounted for by the lack of harmony between manufacturers in rectifying abuses that have crept into the business.

There is much of interest that might be written of one's experiences of forty-five years in the linseed oil industry, but that would be quite bulky.

Oil Conditions in England. Despite War Have Made "Good Year."

It is not a little satisfaction to Hull, England, seed crushers and oil extractors to know that in the year just ended they have been able to "hold their own," and have had on the whole a good year and reasonable profits. Now that the returns for the completed twelve months are available it is placed beyond dispute that the quantity of raw material dealt with by the mills is fully equal to, if not actually in excess of, that of 1915. In round figures over 600,000 tons of oilseeds and oil nuts, or 3,250,000 quarters, have been absorbed, this immense aggregate once more being fully one-half of all the oilseeds imported into the United Kingdom in the year, and entitling Hull to still claim to be the foremost seed-crushing and vegetable oil producing center not only in the United Kingdom, but of the British Empire.

When it is remembered that the industry has had its full share of the drawbacks inseparable from war conditions, the result is even more gratifying, and an excellent testimony to its vitality. Nearly every man of military age has long since been swept from the mills into the pursuit of the arts of war, and their places not only at the presses, but in the warehouses and on the docks have been filled with women and boys. Irregular supplies due to difficulties of transport, higher working costs, and countless other new and difficult circumstances have faced everybody, but it says much for the will to overcome them and the good organization and adaptability from the highest to the lowest unit that they have not been insurmountable, and that so much has been done to keep things going. In all directions an outstanding feature has been the abnormal prices, which for raw materials and certain products have reached phenomenal and record levels, due in the main to the great cost of oversea transport and the favorable position growers have been in to demand their own terms.

THE WHOLESALE DRUGGIST AS A SAFETY VALVE AND TRANSMITTER OF ENERGY.

By JAMES W. MORRISSON, President, N. W. D. A.

LET me say at the outset that while I meekly submit to the title imposed upon me by an editor for whose insight, discrimination and blue pencil I have a respect that approaches awe—I do not propose to be bound by it.

This title suggests that the wholesale druggist is a mechanical device—and a vitally important one in a powerful and complicated machine. He is that, but to me he seems something infinitely more human as well, and of this human aspect I shall also want to speak. Perhaps we can get some light on the wholesale druggist by asking what and why he is. The answer to the why is simple. He exists because he is needed, because he does things for the producer and the retailer that neither can do for himself.

To describe these things is almost to define a wholesale druggist and answer the question of what he is and that is not so simple—for some wholesale druggists are pure distributors and some are not. (I hope every reader will realize that the word "pure" in this connection has no moral significance but is nevertheless almost as ambiguous as when it has.) But even those wholesalers who are not pure distributors do perform extensively a purely distributive function, and when we describe that we describe wholesale druggists generally. Generally, then, the wholesale druggists acts as a reservoir of goods, of credit and credit information, of general information and of sales energy. Let us be more specific. There are 240 wholesale druggists in the United States with merchandise stocks of from about $100,000 to close to $1,000,000. Suppose we put the average at $250,000. At that low figure there would be $60,000,000 of manufacturer's stocks on the shelves of wholesalers, and while the producers carry a part of this as open accounts it is but a small part. The great bulk of these stocks is carried by the wholesaler's money and the vast sum that this represents is in the hands of the producer for further production. And these stocks do more than relieve the pressure on the producer's capital. They relieve the strain upon his manufacturing organization as well—for when there comes excessive or unexpected demand these stocks absorb the first shock and equalize the flow of merchandise.

I do not want to enter into an argument for the existence of the wholesale druggist, but perhaps we can get a mental picture of the effect of these stocks on the flow of merchandise by imagining that they did not exist.

This country is approximately 3,000 miles from coast to coast, and about 1,400 miles from the Gulf to Canada. Measured in freight time it is two to three weeks from east to west, and 10 days from north to south. Even from a central point like Chicago, the whole country can be reached only at great delay.

The Wholesaler as a Reservoir of Goods and Credit.

Producers cannot carry branch stocks in enough points to give next day or even second day delivery to the retail drug trade and small manufacturers, and yet the retail drug trade and small manufacturers are organized on the basis of and are utterly dependent on next day or at most second day delivery. If they cannot get it on a particular line of merchandise, sales of that producer will suffer for lack of goods in the hands of retailers or small manufacturers to meet or create the demand.

Now, aside from the fact that the retail druggists' profit demands small stocks and quick turnover, the main reason for the need of quick delivery is a financial reason. The only way to avoid the need of frequent and quick delivery is to carry large stocks. Large stocks mean large investment. Retailers and small manufacturers have not generally the money to invest. They must buy almost from day to day from a nearby shipping point. Now, if these wholesalers' stocks did not exist the retailers would have to have larger stocks, more storeroom and more help, and the producers would have to carry most of the enormous investment represented by stocks in the hands of wholesalers.

But that is not all, for the retailers are not able to immediately pay for the goods they now buy. It is estimated that wholesalers have outstanding on their books at all times accounts due from retailers amounting to $25,000,000 to $30,000,000. It is estimated that credit losses on total sales of about $160,000,000 are over half a million, and it is certain that the only reason that losses are not vastly in excess of this is that wholesalers are able to keep in close touch with customers through frequent visits of salesmen and through credit departments conducted at great aggregate expense. No distant producer with infrequent sales could handle these credits without great waste, even if he were willing and able to tie up the large funds necessary.

The Wholesaler as a Reservoir of Sales Energy.

I have gone rather fully into the matter of the wholesaler as a reservoir of merchandise and credit. I think I need say nothing of the wholesaler as a reservoir of general information and of sales energy; for every one knows of the army of technical and merchandising men in the wholesale drug trade, and knows, too, of the greater army of thousands of wholesalers' salesmen. Now what is the significance of all of this?

To market a product there must be production, sales promotion and distribution, and these, though interrelated, are utterly distinct and different functions. There is no moral reason why they should not all be performed by the same organization; there may be, and usually is, a strong economic reason why they should not be.

The producer has a certain limited amount of energy at his command—the stored-up energy of plant and materials and money, the present energy of the men of his organization. This energy he must convert into new products and the sale of present products with the minimum of waste and friction.

Human Functions of the Wholesaler.

I have tried to show some of the things that the wholesale druggist does to facilitate the steady flow of merchandise from producer to user—things that the producer cannot do without enormous increase of stored and present energy—without excessive waste. Looking at the wholesaler as a distributer only, and ignoring his other functions, his place in the business machine is that of a regulator and transmitter of the energy of the producer. But the wholesaler has other and more human functions. Wholesale druggists, through their association and individually and in co-operation with other branches of the trade, were earnest advocates of anti-narcotic and pure-food and drug legislation. They had much to do with insuring adequate bills during the formative period. They materially aided the passage of the bills, and, as the records show, have been most loyal and enthusiastic upholders of the law since then. This intelligent and unselfish insistence upon and support of laws for the protection of the public, even though the responsibility and expense of the wholesaler was thereby increased, is a bright page in the annals of the trade.

Wholesalers and Legislation.

It sometimes happens that the wholesaler opposes laws that are proposed to affect reforms. It must be remembered that there are more than 100,000,000 people in this country, and that a surprisingly large number seem to believe in salvation by legislation. They no sooner see what they think is an evil than they rush to Congress or a State Legislature with a bill which, if it became law, would in most cases be worse than the evil it was designed to cure.

There are wholesalers in nearly every State who keep in touch with proposed legislation, and who, by opposing ill-considered bills, perform a service of inestimable value to producers and society at large.

It is, perhaps, unnecessary to say anything about wholesalers as stabilizers of trade conditions; their work for uniform bills of lading and uniform State legislation; their efforts to prevent price demoralization, whether by price cutting, bonuses or coupons; their constant education of the retailer in sound merchandising, and the splendid part they have played in limiting the inevitable demoralization following the outbreak of the war are no doubt known to every reader of the Oil, Paint and Drug Reporter.

The editor has asked me to say a word about conditions after the war.

Conditions After the War.

Prophecy is dangerous ground upon which I hesitate to tread. This much I think can be safely said.

In the countries at war industries have been organized and centralized to a hitherto unheard-of degree. All of the resources of the nation have been mobilized to make them efficient. That they are efficient is generally admitted. Does any one suppose that they will ever return to the wastefulness and inefficiency of the unregulated competition of small units? In this country our laws encourage exactly this sort of competition, and in effect, if not in word, prohibit even reasonable co-operation. Can anyone doubt the result when the two systems clash in an open market? Must we depend in the future upon a high protective tariff to defend not only our so-called American standard of living but our defective industrial organization as well?

> Should we not and shall we not rather admit that what we have called free competition is a wasteful, destructive and demoralizing mistake and find a remedy in amending our laws to permit of closer co-operation and more central control of the units of industry?

I think so, and I think that national opinion is coming to this conclusion. And what of the wholesale druggist, should this reorganization of industry come about? I think there will still be need of him, but I think the situation will not only permit but demand more centralization, greater co-operation and less waste than characterizes the wholesale drug trade to-day.

JAMES W. MORRISSON

President, National Wholesale Druggists' Association.

James William Morrisson, the newly elected president of the National Wholesale Druggists' Association, and the president of the Fuller-Morrisson Company of Chicago, is a native of Indiana, having been born at Richmond, that State, September 1, 1872, and the son of Robert Morrisson, who was the president of Morrisson, Plummer & Co.

This wholesale drug business was originally started in Richmond, Ind., in 1873, by Jonathan W. Plummer and Robert Morrisson, and called Plummer & Morrisson. The firm found Richmond too restricted a market to support a wholesale drug house, and in 1876 moved the stock to Chicago and consolidated with E. Burnham & Sons, wholesale druggists, and the name of the firm then became Morrisson, Plummer & Co., being a co-partnership with Robert Morrisson as senior partner.

The business was later incorporated under the same name, Robert Morrisson continuing as president until his death in 1888. Mr. Plummer then became president and continued in that office until about 1900, when Mr. James W. Morrisson was elected president.

On January 1, 1915, Morrisson, Plummer & Co. and Fuller & Fuller Company consolidated and the corporate name then became Fuller-Morrisson Company.

For several years Mr. Morrisson has been active in the Chicago Association of Commerce as its general secretary, and in 1915 as its first vice-president, which gave him control of the first of the four main divisions into which the association work is divided, namely, the interstate division; the other divisions being the local, foreign trade and civic industrial.

He is still a member of the Senior Council of the Chicago Association of Commerce, a member of the Finance Committee, a member of the Executive Committee on Military and Naval Affairs, and chairman of the Committee on Soldiers' Relief and Welfare of the same association.

Mr. Morrisson is a member of the Chicago City Club, a social club for the purpose of civic betterment. He is also a member of the Union League Club, Chicago Athletic Club, Chicago Literary Club and the Skokie Country Club.

In February, 1900, he married Mary T. R. Foulke, Jr., daughter of William Dudley Foulke, Civil Service Commissioner under President Roosevelt, and former president of the Civil Service Reform Association. Mr. Morrisson has four children, three boys and a girl.

He first attended a meeting of the N. W. D. A. at Boston in 1903. Mr. Morrisson has served the association in many capacities as chairman of the Committee on Fire Insurance and as a member and chairman of other important committees. He was elected fourth vice-president at the meeting held in Boston in 1903, and first vice-president at the meeting held in New York in 1911. He was elected a member of the Board of Control in 1912, 1913 and 1914, and in 1915 was elected chairman of the Board of Control.

THE PART BIOLOGICAL PRODUCTS HAVE PLAYED IN THE WORLD WAR.

By MILTON CAMPBELL, President H. K. Mulford Company.

IT is impossible, within the limits allowed to a paper of this kind, to give an adequate idea of the part biological products have played in the world war. Much has been told of the immense amount of munitions of war, food and other supplies which the United States has been called upon to supply, but there has been practically nothing said concerning the large amount of antitoxins, serums, bacterins and other biological products furnished by the United States.

The call upon this country for supplies has been largely due to the unpreparedness for war existing in European countries when war was declared. The warring nations did not realize when the first gun in this mighty conflict was fired that one of the most disastrous wars in the history of the world had been ushered in. In this struggle millions of lives have already been sacrificed, millions of soldiers have been wounded or otherwise incapacitated, and the blighting effect of the war upon nations engaged in it will probably not be removed for years to come.

The destructiveness of each and every kind of appliance used for killing men being used in the war is perfectly appalling. Much has been reported concerning the destructiveness of the great guns, poisonous gases, terrible hand grenades and other implements of death, but there has been practically nothing reported concerning the large amount of biological products employed to save life and prevent suffering. Let us therefore consider briefly some of the good that has been accomplished by the employment of biological products in the present European conflict.

Some of the Good Accomplished.

Smallpox vaccine was the first biological product used by the armies of the world for preventing epidemics of the disease which in the past was so disastrous to armies in the field. In May, 1800, smallpox vaccination was adopted in the English army, and shortly afterward in the royal navy. In July of the same year a declaration was signed by many medical men in London, expressing their confidence in this practice. It was more than a hundred years before other biological products were employed in combating epidemics of infectious diseases.

In 1893 attention was directed to the remarkable results following the use of diphtheria antitoxin, recently discovered by European scientists almost simultaneously in Germany and France, and a laboratory for the production of diphtheria antitoxin was established in this country under the direction of Dr. Joseph MacFarland. In 1894 the first diphtheria antitoxin was placed on the market in the United States.

Tetanus antitoxin was also discovered about this time. The researches of medical scientists now commenced to bear fruit as never before, because the causes of infectious diseases were rapidly discovered one after another and corresponding serums were produced to supply the demand created by these investigations. Then came the discoveries of Sir Almroth E. Wright and his co-laborers, and the introduction of bacterial vaccines, to be followed in a short time by the discoveries of Besredka, working in the Pasteur Institute, Paris, France, and the introduction of sensitized bacterial vaccines or serobacterins.

Little did the founders of the first biological laboratory in this country realize that within twenty years thereafter they would be called upon to aid the nations of the world in protecting the lives of their soldiers engaged in mortal conflict, fighting in the greatest war of history. That the warring nations should turn to the United States for their supplies was very natural. This country was prepared to meet the demand.

Large Reserve Supply Here at Outbreak of War.

It was not long before other laboratories were opened for the production of biological products. This industry had grown to large proportions, and we had in this country when the European war broke out the largest reserve supplies of biological products anywhere in the world. However, the demand grew very rapidly owing to the marvelous results obtained by the use of vaccines and serums in controlling epidemics of infectious diseases in the European armies, consequently, in spite of our preparedness, we were forced to add largely to our facilities. The sole purpose of our vocation as producers of biological products is the saving of life and the prevention of disease. Therefore the rapid growth of the biological business as a result of the European war has been especially gratifying.

I have already referred to smallpox vaccine as the first biological product used in combating epidemics of infectious disease in armies. Next in importance was the introduction of typho-bacterin vaccination against typhoid fever. The use of this vaccine has practically banished typhoid fever from the armies of the world. The vaccine employed consists of cultures of typhoid bacilli which have been so modified by heating them as to destroy their viability, but not sufficiently modified as to injure their immunizing properties.

Typho-Bacterin Immunization.

The splendid results following the employment of typho-bacterin immunization as a preventive of typhoid fever led to the use of other bacterial vaccines. Cholera, para-typhoid fever and Malta fever became a serious menace to the combating armies of Eastern Europe. Dr. Castellani successfully combated this menace by a combined vaccine containing modified cultures of the several kinds of micro-organisms causing these diseases.

Recognizing that a combined vaccine is capable of producing immunity against attacks of a number of different kinds of infective micro-organisms, Wright has been using with great success a combined vaccine containing modified cultures of streptococci, staphylococci and colon bacillia as a preventive against septicemia or blood poisoning, thereby saving the lives of thousands of wounded soldiers that would otherwise have been lost by wound infection.

Tetanus Also Controlled.

Tetanus is another disease conquered by the use of biological products. The earth of cultivated and manured fields in France harbors tetanus spores in enormous quantities. The wounded soldiers became infected with these germs and tetanus (lockjaw) resulted to an alarming extent. In the early stages of the war about 15 per cent. of the wounded developed this disease, with a large mortality. The use of tetanus antitoxin has rendered tetanus negligible as a mortality factor in war.

At one time the British troops in training were threatened with a serious outbreak of epidemic cerebrospinal meningitis, supposed to have been carried over from Canada. The medical authorities at once combated this disease with antimeningitis serum. A large amount was supplied by this country. The disease was soon under control and finally wiped out entirely, resulting in the saving of many lives.

During the Dardanelles campaign and for some time afterward, dysentery became epidemic in the combating armies and large demands were made on us for antidysenteric serum. The use of this product prevented the loss of many lives from epidemic dysentery.

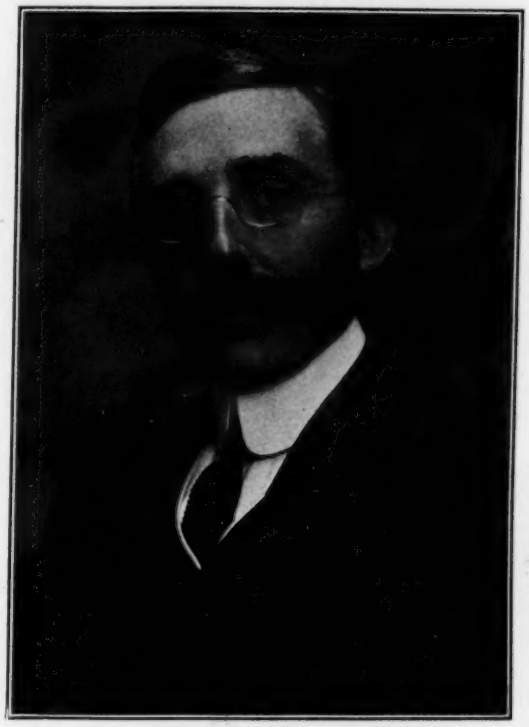
We are also informed that vaccination against gas gangrene is of great value. This disease is due to bacteria and also seems to be prevented by bacterin treatment.

When it is remembered that infectious diseases have proved more disastrous to the armies of the world during the past than the weapons of the enemy, and that these diseases have been placed under control by the use of biological products for their prevention and treatment, the important part played by these products becomes at once apparent.

Fear of Epidemics Removed.

The protection of lives and the immunity conferred against certain bacterial diseases heretofore uncontrollable has removed the fear of epidemics where large bodies are assembled. It has insured the health of the armies. It has relieved the hospitals from diseases that are preventable, and thus permitted better attention given the wounded—and it has overcome that great spectre of fear of disease—which in the past wars destroyed the morale and courage of the soldiers as no other exposure to the fortunes of war can impress upon the soldier at the front.

The debt that mankind owes to the discovery of biological products is beyond computation for what it has already accomplished in conserving human and animal life, and it will become greater as the value in prevention of diseases becomes better understood and in consequence more generally applied.



MILTON CAMPBELL.

President of the H. K. Mulford Company.

Milton Campbell was born at Easton, Md., October 1, 1862. After leaving high school, being desirous of studying medicine, and having been told by his family physician that a course in a drug store should precede a course in medicine, he entered the drug store of John Campbell Henry, of Easton, a cousin, where he remained for two years. He then went to Philadelphia and took a position with J. T. White at Twenty-first and Pine streets, where he remained during his pharmacy course. He graduated from the Philadelphia College of Pharmacy in the class of 1883.

A year after graduation he was taken into partnership by Mr. White, and the firm's name was changed to White & Campbell. The partnership lasted for one year, at which time Mr. Campbell purchased Mr. White's interests and the business was conducted under the name of Milton Campbell.

During this time Mr. Campbell had taken a post-graduate course in chemistry under Professor Leffman, meanwhile keeping up his study of medicine, without having an opportunity to attend lectures or matriculate at any medical school.

In 1889 he became associated with Mr. Mulford when Mr. Campbell purchased one-half interest in the H. K. Mulford Company then located at 1800 Market street, Philadelphia. Two years later the H. K. Mulford Company was incorporated and Mr. Campbell became president, which position he still occupies.

The position of the Mulford Company is well known. Their efforts have been directed toward the improvement of pharmacy and medicine and they have taken the position of pioneers in biological work, as well as in physiological and assay work.

ZINC AS A RAW MATERIAL AND AS A FINISHED PAINT BASE.

By H. G. CLOPPER, New Jersey Zinc Company.

THE use of zinc oxide as a commercially available paint pigment is less than seventy-five years old, but during that comparatively short time zinc white has made for itself a place second only to that occupied by white lead, which has been the standard white pigment in the painting art for nearly twenty centuries.

The greatest impetus to increased consumption was given by the invention of the direct, or American, process of manufacture. This process permits the manufacture of the oxide on a large scale directly from the ores of zinc; the older indirect, or French, process involves the production of spelter, or metallic zinc, from the ore and subsequent treatment of the metal to produce the oxide. The exceptional freedom from objectionable impurities of the zinc ore deposit at Franklin, N. J., permits the production of an oxide closely approximating in color and other physical properties the more expensive product of the French process.

Shortly after the appearance of this oxide on the market the ready-mixed or prepared paint industry was started, and because of the suitability of zinc oxide to the requirements of this new product both industries rapidly increased in importance. The growth of the zinc oxide industry, like that of the prepared paint industry, which is, to a considerable extent, dependent upon it, has been steady and rapid, and there is every reason to expect that the rate of increase will be maintained.

First Effect of the War.

The sudden outbreak of the war in Europe affected the zinc industry as well as all other industries based on metallurgy. Its first effect was to remove from the world's markets the output of the plants in Belgium and eastern Germany, suddenly throwing upon the United States the burden of supplying the requirements of practically the entire world outside of the Central European Powers. As a consequence the plants of American producers were found inadequate to meet this increased demand; prices for spelter rose to unprecedented figures, new construction was started on a large scale, and mines that were unprofitable under ordinary conditions were enabled to operate.

French process zinc oxide, being produced from spelter, promptly reflected the advanced price of the metal. American process oxide would naturally have taken the same course but for the fact that the manufacturers, realizing the partial dependence of the paint industry on this product, considered it both just and good policy to ignore the opportunities of the situation and hold the price of oxide within moderate limits that would not hamper the industry. Consequently, at a time when the metallic contents of a pound of oxide were selling in the open market at from twenty to thirty cents, the oxide itself was sold to paint manufacturers at less than half that amount.

New Consumers of Zinc Oxide.

During the last few years a new and unexpected factor has affected the consumption of oxide. Manufacturers of vulcanized rubber goods have always been consumers of zinc oxide, but the rise of the automobile industry and the consequent increase in the demand for rubber tires has completely upset all calculations as to the growth of demand in this field. It is well known that the great expansion in this field has come within the last two or three years, and the addition of this increased demand threw upon oxide manufacturers the duty of meeting it without injury to the paint industry. This, I believe, was accomplished as fairly and as satisfactorily as was possible at the time.

Passage of Rule of Thumb.

Paint technology, as a result of improvement in methods and the application of research to practice, has greatly advanced during recent years. There is a decided tendency to utilize several pigments in combination rather than to follow the old rule-of-thumb practice of using one or two pigments with their virtues and defects. As a consequence there has grown up a large and insistent demand for what are known in the trade as "Leaded Zincs." These are American process zinc oxides containing definite amounts of lead sulphate, or basic sulphate of lead, the lead present being due to the lead content of many natural ores of zinc. The percentage of the lead sulphate in the oxide is determined by selection of the ore. Such ores are far more abundant than

lead-free ores of zinc, and, as the leaded oxides are suitable for most of the requirements of paint manufacturers, the demand is rapidly shifting to oxides of this type.

The final adjustment will probably be on the basis of a minimum of the pure oxide and a maximum of the various grades of leaded oxides for use in the bulk of the products of paint manufacturers. Tire manufacturers, on the other hand, find the pure oxide better suited to their requirements than the leaded oxide, since the percentage of zinc oxide in a rubber tire has a direct influence on its service-value.

Changes After the War.

Opinions as to the future must be more or less presumptuous. Upon the termination of the present war many of our conditions will be quickly changed. That such changes will be wholly detrimental, however, is not to be inferred from past experience. Some price levels, due more or less directly to present conditions, will undergo readjustment. In the zinc industry, specifically, it does not now appear probable that this readjustment can be very rapid or extreme. The American demand certainly should not be lessened by an event which will release our commerce from its present burdensome restrictions. On the other hand, it can scarcely be expected that the plants within contested areas of the war zone can be quickly put into shape to operate, so as to become active competitors within a short time. Reconstruction and readjustment should prove a leisurely process, giving ample time for corresponding readjustments on this side of the Atlantic.

Nevertheless, the fact remains that when ante-bellum conditions are finally attained, those zinc mines that formerly were unprofitable will once more prove unremunerative, and the surplus metal-producing capacity created to compensate for the cessation of European production will become superfluous beyond that necessary to satisfy the increase in the world's consumption which has meanwhile taken place.

As for the future of zinc oxide, there is no reason to doubt that there will be a steady increase in the demand both of the paint trade and the rubber trade, as the merits of products made from it become more and more familiar to the consuming public.

HERBERT GRAHAM CLOPPER.
General Sales Manager, New Jersey Zinc Company.

Herbert Graham Clopper was born in Camden, N. J., August 12, 1873, and was educated in the public schools at Camden. His business career began on January 21, 1889, when under sixteen years of age he entered the employ of the Lehigh Zinc and Iron Company, Philadelphia, as office boy. When the present company was formed on July 12, 1897, Mr. Clopper was assigned to the accounting department as an assistant bookkeeper. On May 1, 1899, he was transferred to the purchasing department and entered the department as clerk. During the five succeeding years he occupied various positions in the purchasing department, building a foundation for the greater purchasing responsibilities which were to come. On May 1, 1904, he was made purchasing agent of the New Jersey Zinc Company and began the complete reorganization of the department.

He was a student of detail with a view to perfecting as efficient a purchasing department as possible, and made an elaborate study of purchasing systems and methods in vogue with other large and successful industrial corporations and railroads. On August 1, 1912, when the company created the general purchasing department and included therein the purchasing departments located in different sections of the country, Mr. Clopper was selected as head of this organization, with the title of general purchasing agent. This change necessitated comprehensive control of a large and widely scattered purchasing power. It was at this time that Mr. Clopper's detailed knowledge of the purchasing end of the business and its requirements, together with his ability for the development of organization, enabled him to weld together one of the largest and most efficient purchasing organizations in the country.

Shortly after this W. W. Melvin, who has been sales manager of the New Jersey Zinc Company for approximately half a century, retired, and the position of general sales manager of the company was created. On June 1, 1913, Mr. Clopper was selected for this post. This change from the purchasing to the selling end of the business required more or less of a psychological change of viewpoint, but the experience obtained by Mr. Clopper in the purchasing end of the business, with the knowledge gained of the selling methods and campaigns of various other organizations, stood him in excellent stead.

Since 1913 the company has grown to a considerable extent, and the organization of the sales department has kept pace with this growth. This has required the creation and development of new branches of the sales organization, both domestically and abroad. Mr. Clopper's knowledge of detail and appreciation of the necessity of systematic routine, together with his executive capacity, has made possible the development of the sales organization of the company along broad and comprehensive lines.

"WHAT IS THE GREATEST OPPORTUNITY FOR THE MIXED PAINT INDUSTRY TODAY, AND HOW CAN IT BE GRASPED MOST SATISFACTORILY AND EFFECTIVELY?"

By ERNEST T. TRIGG, of John Lucas & Co., Philadelphia.

THE greatest opportunity for the mixed paint industry is to educate property owners and the public generally:—

First—To the necessity of the use of paint for preservation.

Second—To its desirability from the standpoint of personal and civic pride because of its decorative properties.

If the public generally were educated to the fact that there is undoubtedly a greater annual property waste due to decay, because of the failure to use paint, than is represented by the annual destruction of property by fire, the waste in that direction would soon stop and the consumption of paint increase proportionately.

While there are no statistics to prove the assertion, so far as I know, it nevertheless seems conservative to say that not over 25 per cent. of the paintable exterior surfaces of buildings and strcutures of various kinds in this country are painted with sufficient frequency to properly protect and preserve them against the action of the elements. This condition of affairs presents a wonderfully big field for development of and increase in the mixed paint industry, as well as all other branches of the paint industry.

The Position of the Manufacturer.

The mixed paint manufacturer depends for the ultimate distribution of his product upon the local dealer. This local dealer is usually a hardware dealer, druggist or general store. Such dealers having other products to sell which they consider their main lines, they often fail to give paint the personal attention required to develop the local consumption. Most manufacturers, of course, supply their dealers with various forms of advertising matter, service, etc., but, after all is said and done, the distribution by the average dealer is looked after in rather a perfunctory sort of a way, and the dealer sells paint only when the buyer comes to him for it. He does not, as a rule, work the local possibilities thoroughly and, as a consequence, does not get anything like the volume possible.

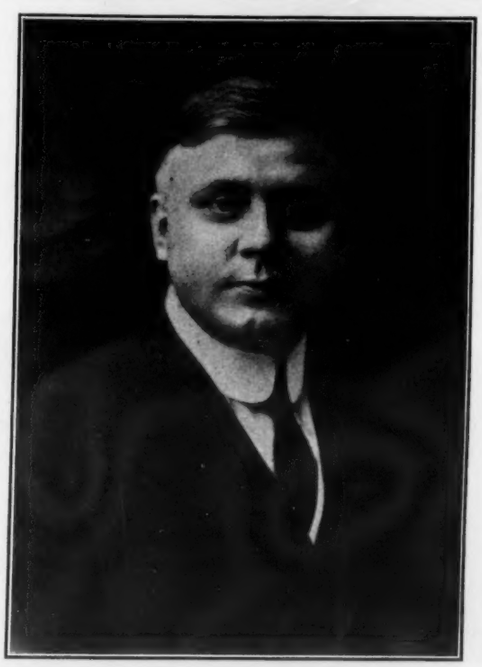
The industry as a whole has allowed this condition to continue too long. Some definite, concrete and well-defined effort must be put forth by paint manufacturers to create more knowledge of paint and its necessity in the mind of the consumer. Mixed paint manufacturers find themselves to-day competing with one another in an endeavor to get the trade of the dealer, apparently feeling satisfied with their effort and feeling that their work is done when they have taken the dealer's business away from some other manufacturer. But while one manufacturer is taking a dealer's account away from a competitor, the competitor is probably doing the same thing with the customer of some other manufacturer, and so on around the circle. Surely there are not enough new dealers' accounts opening up in various towns over the country, and there are not enough new towns springing up where dealers start in business, to afford an appreciable increase in the average business done by any paint manufacturer.

So long as the paint manufacturer has before him as his goal and the sole object of his ambition the securing of new dealer's accounts, without looking into the subject any deeper, we are going to continue to have the conditions which have existed for some time, which, summed up in a few words, means that the manufacturers are simply trading customers with one another and in the final analysis are making no real progress.

Dealer a Necessary Link.

What the industry as a whole must do is to consider the dealer as a necessary link in the distribution chain and devote its effort to the development of more business from the real consumer.

Let me deal in a little supposition to make the point plain. If the estimate that not over 25 per cent. of the paintable structures are painted with sufficient frequency to keep them in good condition is conservative, then suppose by properly directed effort it was possible to change this figure to 50 per cent.; that would mean that on an average every dealer would sell twice as much paint as he is selling to-day, and if the dealer's business increased his orders to the manufacturers would naturally be increased to the same extent. Every manufacturer could well afford, under such circumstances, to refrain from trying to take dealers' trade away from other manufacturers and depend for his increase upon the larger volume of business which came



ERNEST T. TRIGG.

Ernest T. Trigg was born August 12, 1877, at Aurora, Ill. When a boy of nine his parents moved to Chicago and young Trigg attended the public and high schools at Chicago. He has been in the paint business since July, 1892. His first experience was with E. H. Haines, a manufacturer's agent in Chicago selling raw materials to paint grinders. Mr. Haines assisted Mr. Trigg in getting a position with the Heath & Milligan Manufacturing Company in November, 1896, where he remained until 1908. In March of that year Mr. Trigg moved to Philadelphia and took the position of general manager of John Lucas & Co. On the incorporation of the latter company in 1912 Mr Trigg became vice-president and general manager.

Mr. Trigg has had many activities and interests outside of those of his business: Ex-president Paint Manufacturers' Association of the United States; director Philadelphia Chamber of Commerce; member Executive Committee, Board of Directors Philadelphia Chamber of Commerce; member Executive Committee Philadelphia Paint Club; trustee Temple University, Philadelphia; president Temple University Association; national councillor Chamber of Commerce of the United States of America since its organization, representing Paint Manufacturers' Association. For the past ten or twelve years he has been active in committees of the Paint Manufacturers' Association and the National Varnish Manufacturers' Association.

to him from his own dealers. If the consumption of paint could be increased—as I feel it can in time—to more nearly the 100 per cent. point than 50 per cent., it would not only mean the grasping of and realization upon the greatest opportunity before the industry, but it would actually be of the greatest possible economic value to every community, and would be a long step forward in conservation of building materials of all kinds, especially lumber. As a nation we have often been charged with wastefulness. No place is this more apparent than in the failure to protect and preserve properties by a frequent and intelligent use of paint. Economic conditions in this country, especially as applied to forestration, are very different to-day from the conditions which existed with the early settlers. The following quoted from the history of "Samuel Wetherill and the Early Paint Industry in Philadelphia" by Mrs. S. P. Wetherill shows how different the situation was in the early days of the seventeenth century:—

"The simple habits of the early settlers, their poverty and struggles for subsistence, prohibited the use of paint for decorative purposes, while the abundance of timber rendered it unnecessary to be at any great expense to protect the wood from destructive action of the elements; so the use of paint was not only discouraged as extravagant, but history reports that 'the Rev. Thomas Allen, of Charlestown, near Boston, was called to account in 1739 for having paint on his dwelling.' It was considered that by so doing he was encouraging the tendency to showy, aristocratic ways of living that would endanger the morals of the community.

Another side to this question, which, while of secondary imporatnce to the proposition of paint as a preservative, is nevertheless important, namely, paint's decorative properties. There are very few persons who have not the feeling of personal and civic pride. They like to have themselves and their children dressed as well as the neighbors' and have all the advantages others in their community and standing enjoy. As a group, too, they like to feel that their community is up to date and at least compares favorably with other similar communities. There is no one thing which brands a man in his community as slovenly and careless and earns for him, perhaps, the unjust reputation of poverty, than neglect of the condition and appearance of his property; and, by the same token, his local reputation and standing, including his credit and consideration in financial dealings, is invariably strengthened if he is known to keep his property in the best of condition. Just as the individual's standing is affected, so is that of the community. Properties well painted and kept in a good state of repair mean desirable locations and enhanced values. As stated before, however, the public must be educated to the necessity and desirability of more frequent use of paint. Paint is considered by too many people today enitrely from its decorative standpoint and, consequently, its use is too easily dispensed with. Summed up, therefore, it seems to me the greatest opportunity for the mixed paint industry today is to put forth a determined effort to increase the consumption of paint, regardless of name or brand; and this I believe can be done most successfully and efficiently only through an educational campaign carried on by the whole indusrty in an impersonal way and with sufficient force and frequency and over a sufficient length of time to make a lasting impression on the mind of every present and prospective property owner in this country.

COTTONSEED AND CORN AS FACTORS IN LOWERING THE "HIGH COST OF LIVING."

By GEORGE W. COVINGTON, President Interstate Cottonseed Crushers Association.

IN cheap fat, cheap forage, fiber and protein the cotton growers and the cotton oil mills during the past quarter of a century have contributed ten times more to the lower cost of living of the entire world than any industry whatever.

All these products of the cotton plant have followed, not led, the advance in prices due to this terrible foreign war, and all these products today are relatively cheaper than similar or competing products. He who would today keep his living expenses lower has but to insist, wherever possible, that the clothing, the fat, the food, the feed used by him, both for his family and his domestic animals, shall be in whole or in part from some part of the cotton plant.

Nineteen hundred and sixteen has shown largely increased values in all farm products. Yields the world over have been short. All field crops, as well as live stock, show a decreased production. The consumption of food products has increased faster than population, due in large part to the waste of war. The soaring price of corn and other food crops is forcing the premature marketing of live stock, which means shortage and higher prices later. There is today a strong demand for restricted exportation of food products from this country, that the high cost of living may be reduced, and this is the one subject in which all the people of the United States without exception are interested in at the present moment.

Sixty-five Per Cent. of Farm Production Corn.

There are today in the hands of American farmers millions of bushels of corn, probably 65 per cent. of their whole production, almost enough in this single article of fat protein and carbohydrates of the most palatable sort, to feed the world of human beings directly.

That this corn is being held back on our farms, not for speculation, but to produce brawn and muscle in our plow horses and mules that greater crops may be raised next year, and to feed and fatten cattle, sheep, hogs and poultry that the world may not want for meat, is greatly to our farmer's credit.

But could the farmer be made to see that the fat and protein in the abundant supply of cotonseed meal we produce is interchangeable with the fat and protein of corn, as far as meat production of all these kinds is concerned up to one-half of the ration of corn, and that a material containing at least 36 per cent. of protein, as cottonseed meal does, can surely replace one containing but 12, as corn does, one pound for two, not only could our farmers effect an enormous saving in their own expense for raising meat but could release and sell at a profit half their stock of corn for human food.

Cotton and Corn Make for Cheaper Living.

Cotton and corn were copartners in the upbuilding of the South after the ravages of the Civil War. Cottonseed and corn should be copartners in making living cheaper to the American people during these strenuous times of foreign war.

If our United States Department of Agriculture will but publicly and forcefully advocate this exchange of protein and fat between cottonseed meal and corn on the farm, so that the nation's meat may be more cheaply raised and the nation's homes supplied with an abundance of corn—a cereal far too little appreciated in those sections which have not yet learned to love, as we in the South have, "hog and hominy" for their own sakes—this important department of the National Government can render the American people no greater service at this time, nor can I, as spokesman for a great industry, wholly Southern, speak to better purpose than in calling public attention to the extraordinary opportunity for a tremendous economy which here exists.

One final thought: if the cotton planters and the cotton oil mills are jointly to continue their huge annual contribution to the world's lower cost of living, this bandit raid of the Mexican boll weevil, which has been for more than a dozen years spreading at the rate of fifty miles a year over the cotton-growing area of the United States, must be stopped. As Villa has proved the most elusive of all bandits, so the boll weevil has proved the most illusive of all insect pests, and it is just as proper and right that our National Government should spend millions in stopping the depredations of the one as the other. The extermination of the boll weevil is a national problem and should be so treated by Congress.

GEORGE W. COVINGTON.

President of the Interstate Cottonseed Crushers' Association.

George W. Covington, of Hazlehurst, Miss., president of the Interstate Cotton Seed Crushers' Association, is well known to cottonseed men in all sections of the country.

His training has been a diversified one. After graduation from college in 1889, Mr. Covington began business life by keeping the books of a retail drug store at Starkville, Miss., from which place he went to the First National Bank of Starkville as teller. In 1891 he assisted in organizing the Bank of Hazlehurst, Miss., and was elected its first cashier. This position he held until 1897, when he organized and became general manager of the Hazlehurst Oil Mill and Fertilizing Company. Mr. Covington is still president and manager of this concern, as well as being interested in, and a director of, seven other cotton oil mills located in Mississippi, and one at Memphis, Tenn.

Mr. Covington was elected president of the Bank of Hazlehurst in 1904, and is still connected with that institution in the same capacity. He is also treasurer and director of the Hazlehurst Lumber Company, the Hazlehurst Compress and Manufacturing Company, the Brown's Wells Company—a large health resort near Hazlehurst—the Royal Feed and Milling Company, of Jackson, Miss., the Coney Lumber Company, Baxterville, Miss., and is also an officer of several other concerns of lesser importance.

ZINC MINED AND SMELTED IN 1916

Average Price for Year at St. Louis 13.7 Cents; London 15.7 Cents.

The zinc-mining and zinc-smelting industries experienced a year of prosperity in 1916. According to the best information available at this time the recoverable zinc content of ore mined in the United States was about 708,000 tons, compared with 605,915 tons in 1915 and 406,959 tons in 1914. The largest district gain was made by the Joplin region, which had an increase of over 40,000 tons. Montana seems to have taken second place. Good gains were also made by the upper Mississippi Valley region, Colorado, Tennessee, Idaho, Nevada, New Mexico, New York, Arkansas, and Washington. The Eastern States produced 148,000 tons, or 21 per cent., the Central States 274,000 tons, or 39 per cent., and the Western States 286,000 tons, or 40 per cent., of the total output of zinc in ore.

There was much activity in the construction of retort zinc smelters during 1916, and considerable additions are under construction or planned for 1917. The number of retorts at the beginning of 1916 was 156,568, on July 1 it was 196,640, and at the end of the year it was 213,840, besides 13,648 additional retorts being built or planned.

The full retort capacity was not utilized in smelting ore at any time during the year. A large number of retorts were occupied in redistilling prime western spelter. Many retorts were idle during parts of the third and fourth quarters of the year but started up again late in the year, though a considerable number were still idle in December.

The capacity, by States, of the regular zinc smelters, together with the additions now planned for 1917, is as follows:

Zinc-Smelting Capacity, 1916.

State.	Retorts in operation Dec. 15, 1916.	Retorts idle Dec. 15, 1916.	Retorts to be added in 1917.
Illinois	42,118	800	1,600
Kansas	37,198	6,778	....
Oklahoma	68,231	6,235	2,472
Other States.....	51,568	912	9,576
	199,115	14,725	13,648
	213,840		

Two new smelters using large graphite retorts were built during 1916. There are now five such plants, with 153 retorts.

Six electrolytic zinc plants were in operation in 1916.

Record Production.

The production of spelter from domestic ore in 1916 is estimated at 553,000 short tons, worth, at the average St. Louis price, about $150,000,000, and from foreign ore at 105,000 tons, a total of 658,000 tons, worth $180,000,000, compared to a total of 489,519 tons in 1915 (458,135 tons of domestic origin, and 31,384 tons of foreign origin), worth $121,400,000 at the average St. Louis price. This was a gain of 169,000 tons in quantity and an indicated gain of more than $58,600,000 in value. The actual gain in value, however, was considerably less because much of the spelter was sold for future delivery at prices from 1 to 2 cents below the quotations for immediate delivery. Included in the output is 11,878 tons of electrolytic spelter, of which a part was refined by electrolysis from prime western spelter. The output of zinc dust was about 2,500 tons, compared with 1,755 tons in 1915.

MINERAL PRODUCTS OF THE UNITED STATES

Calendar Years 1906 to 1915

PRODUCT.	1906.		1907.		1908.		1909.		1910.		1911.		1912.		1913.		1914.		1915.	
	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.	QUANTITY.	VALUE.
METALLIC.																				
Aluminum (consumption) pounds	14,910,000	$4,982,000	17,811,000	$6,090,942	11,182,000	$3,424,800	24,310,000	$8,078,000	27,724,000	$9,258,700	46,128,000	$9,084,000	63,607,000	$11,907,000	72,279,000	$13,949,000	79,139,000	$14,823,700	99,806,000	$17,963,000
Antimonial lead (e) short tons (2,000 pounds)	10,840	1,720,983	9,910	1,333,085	12,025	1,364,771	12,898	1,931,019	14,089	1,888,060	14,078	1,380,888	13,893	1,911,248	10,689	1,591,894	10,907	1,372,167	23,324	3,030,726
Antimony (3) do	1,706	5 302,942	1,913	5 396,196	2,345	5 389,390	2,290	5 388,190	2,229	5 367,357	2,254	5 326,780	1,940	5 332,686	2,506	5 459,963	2,708	5 360,460	2,284	5 373,780
Bauxite long tons (2,240 pounds)	78,323	366,311	97,776	480,330	58,167	283,068	(109,101	679,447	149,932	710,388	155,618	750,649	180,883	766,922	210,381	967,698	219,316	1,009,194	207,041	1,314,324
Cadmium pounds			14,000	(c)	8,000	(c)	5,000	(c)	4,700	(c)	28,125	(c)	52,908	(c)	54,150	(c)	91,409	91,398	91,413	128,443
Chromic iron ore long tons	107	1,800	290	5,643	353	7,230	398	8,300	1 305	5 729	190	1,520	201	5,793	253	5,264	201	5,715	3,581	38,744
Copper (d), value at New York City pounds	917,805,686	177,199,497	969,366,491	173,730,300	942,870,721	124,419,338	1,099,981,634	142,068,711	1,080,189,509	187,180,287	1,027,332,749	137,154,092	1,243,306,720	205,129,238	1,224,484,096	189,795,028	1,180,127,192	152,968,000	1,262,009,927	243,902,000
Ferroalloys (r) long tons	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	283,379	8,377,822	328,093	12,223,779	299,207	12,019,262	283,524	9,250,245	286,644	17,450,385
Gold (f) troy ounces	4,503,333	94,572,900	4,374,227	90,410,700	4,874,340	94,500,000	4,831,701	99,872,400	4,627,018	95,600,100	4,667,063	96,500,000	4,805,717	99,351,800	4,599,784	95,044,400	4,573,976	94,581,800	4,687,804	101,093,700
Iron { ore (g) long tons	47,749,726	(100,897,108	51,720,819	(131,996,147	39,963,336	(91,848,804	51,158,427	(109,004,803	56,999,724	(140,738,927	41,093,447	(96,716,575	57,017,814	(107,080,152	59,648,026	(120,908,858	39,714,280	(71,908,079	58,492,100	(101,283,984
{ pig (r) do	(25,907,191	(309,700,000	(25,791,261	(329,658,000	(18,038,018	(234,321,000	(23,783,471	(418,175,000	(32,874,123	(412,162,486	23,537,295	327,324,934	29,100,965	490,962,796	30,365,913	455,242,243	24,262,202	328,777,659	29,364,480	451,409,804
Lead (refined) (d), value at New York City short tons	330,300	33,330,300	352,251	37,353,306	311,668	26,179,944	352,839	30,344,154	378,402	33,038,376	391,993	34,279,940	393,517	38,336,530	411,976	39,948,344	419,794	39,999,000	397,032	37,690,000
Manganese ore long tons	6,931	85,132	5,904	63,805	6,144	62,770	1,944	19,975	2,288	32,960	2,457	34,566	1,964	15,722	4,049	40,490	3,888	37,377	9,709	113,509
Manganiferous ore (i) do	41,300	122,400	103,844	339,473	55,804	133,104	(68,854	215,233	61,101	186,703	44,437	114,218	51,517	19,942	59,403	23,194	59,263	219,497	105,233	396,290
Nickel (i), value at New York City pounds	(d)	(c)	(d)	(c)	(d)	(c)	(d)	(c)	(c)	(c)	890,000	127,000	(d)	(d)	681,585	70,393	810,324	213,000	1,120,856	449,200
Platinum and allied metals, value at New York City troy ounces	7,330	48,180	297	10,560	750	14,250	638	13,280	773	29,577	940	40,880	1,008	46,778	1,024	46,550	6,394	280,885	8,065	479,000
Quicksilver, value at San Francisco flasks (76 pounds net)	22,062	1,030,279	21,854	889,838	19,792	679,446	21,075	907,800	20,031	988,182	21,256	977,080	20,064	1,050,941	20,213	919,173	18,348	811,690	21,023	1,838,913
Silver troy ounces	56,317,600	30,286,400	53,314,700	27,209,700	53,440,900	28,050,800	54,731,800	28,455,200	57,127,000	30,884,800	60,286,400	33,818,700	62,706,800	35,127,800	60,801,800	40,348,100	73,458,100	40,027,700	74,961,078	37,327,800
Tin (metallic equivalent) pounds		29,600		33,285				17,460		22,447		56,026		104,600		46,000	200,000	60,000	264,000	79,846
Titanium ore (rutile) short tons	(c)	(c)	(c)	(c)				10,000	500	44,480			279	27,500	305	42,000	94	13,000	280	27,200
Tungsten ore (60 per cent concentrates) short tons	939	5 345,897	1,840	5 990,648	671	5 329,955	1,919	5 14,370	1,221	5 33,098	1,139	5 37,989	1,230	5 30,188	1,827	5 73,119	600	5 33,000	2,323	5 130,000
Uranium and vanadium minerals do	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)		5 75,500	(c)	(c)		5 60,501		5 11,200		5 33,780
Zinc (c) { 1906-1914: value at St. Louis do	139,624	26,263,088	223,748	26,401,210	190,749	17,200,406	330,235	24,864,300	353,479	37,367,732	371,821	30,994,794	332,507	44,830,166	337,332	37,772,384	342,416	33,009,000	458,185	113,617,000
Total value of metallic products		660,170,931		904,082,301		580,744,068		734,910,809		793,870,334		666,908,939		966,201,073		960,222,018		691,091,734		992,910,883
NONMETALLIC.																				
Arsenious oxide short tons	737	62,480	1,731	102,000	(c)	(c)	1,214	52,048	1,497	92,305	3,122	73,406	3,141	180,737	3,213	189,338	4,870	213,147	3,809	208,110
Asbestos do	1,820	38,800	693	11,800	936	19,656	2,083	62,603	2,652	68,257	7,904	110,935	4,452	97,980	1,100	11,000	1,047	12,565	1,731	70,962
Asphalt do	138,050	1,380,500	223,801	2,236,480	198,282	2,057,891	238,635	2,138,973	260,080	3,050,067	264,306	3,091,106	449,310	4,650,721	309,180	3,362,270	5 440,571	5 3,080,000	760,354	5,319,072
Barytes (crude) do	60,231	160,587	89,621	291,777	39,527	130,443	61,068	200,750	49,978	191,766	39,465	152,793	57,478	182,019	49,296	156,273	5 52,747	5 196,047	109,847	391,033
Borax (crude) do	86,172	1,182,410	82,850	1,131,820	5 23,000	978,000	41,634	1,834,385	43,257	1,901,893	39,330	1,369,181	43,813	1,157,613	38,091	1,491,530	62,400	1,464,400	67,005	1,677,000
Bromine pounds	200,128	128,004	1,000,027	198,281	760,003	72,783	760,723	87,600	248,427	31,884	531,541	115,000	647,200	149,808	879,600	119,136	879,991	203,094	839,887	200,207
Calcium chloride short tons							12,863	63,198	10,971	74,710	14,606	91,316	18,550	117,273	19,811	130,099	19,600	121,786	20,836	135,600
Cement barrels (380 pounds net)	31,000,443	39,302,277	35,230,242	45,903,851	30,910,925	44,477,556	36,660,715	53,610,563	77,793,141	99,752,062	79,947,956	96,709,126	88,555,631	89,304,283	89,241,248	98,550,577	87,237,352	90,333,203	87,865,222	79,155,102
Clay { products		101,032,722		109,243,289		102,127,703		108,221,019		170,113,974		161,296,181		172,811,273		191,280,122		164,990,263		105,180,203
{ raw (g) short tons	2,027,483	5 2,245,395	2,183,679	5 2,548,548	1,732,901	5 2,000,000	2,152,647	5 2,545,707	2,320,229	5 2,833,483	2,180,008	5 2,420,752	2,850,393	5 3,206,092	2,947,980	5 3,180,159	2,999,900	5 3,736,398	3,260,864	5 3,871,941
Coal { bituminous (k) do	348,874,987	391,162,115	394,780,110	451,314,843	338,573,044	374,130,208	378,744,557	408,486,777	417,111,143	499,281,719	408,907,038	451,373,810	450,104,882	517,993,443	478,433,297	568,234,882	422,703,970	492,209,244	443,824,426	502,027,566
{ Pennsylvania anthracite long tons	63,843,010	191,517,894	78,822,631	103,984,066	74,947,106	188,178,949	72,264,949	149,181,567	79,432,240	180,273,302	80,771,486	179,180,329	79,992,835	177,022,826	81,719,980	195,181,187	81,060,831	188,191,390	79,650,873	194,252,466
Cobalt oxide pounds	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)												
Coke (g) short tons	26,601,217	5 61,209,004	40,779,564	5 111,830,196	26,033,618	5 65,683,983	39,315,068	5 99,066,482	41,708,810	5 99,748,701	38,531,489	5 94,130,649	42,062,900	5 111,808,118	46,299,830	5 128,022,373	34,598,914	5 88,336,217	41,661,190	5 108,803,900
Diatomaceous (infusorial) earth and tripoli do	8,089	79,106		104,400		97,542		139,548		130,008		147,469		139,449		200,331		203,227		1 611,021
Emery (also corundum in 1906) do	1,160	44,310	1,009	18,204	68a	1,748	1,880	18,185	1,025	18,077	559	6,778	961	6,655	997	4,788	685	2,425	3,063	21,131
Feldspar do	73,850	401,831	91,799	589,044	70,474	426,553	76,530	454,802	81,102	502,452	83,700	579,008	98,572	825,362	120,885	776,851	103,410	639,572	112,700	669,356
Fluorspar do	42,796	244,039	49,488	287,243	39,795	233,908	58,742	293,747	69,627	420,189	57,048	311,447	116,943	789,165	113,560	760,396	93,116	570,041	100,941	704,473
Fuller's earth st	33,040	269,400	32,851	291,773	29,716	279,267	33,490	301,604	32,823	289,709	40,967	393,194	32,718	356,923	38,504	390,730	40,961	403,940	47,801	480,319
Garnet for abrasive purposes do	4,850	157,000	7,206	211,686	1,996	64,290	2,972	102,218	3,814	113,874	4,076	121,743	4,947	163,327	5,209	182,429	4,231	149,810	4,201	199,964
Gems and precious stones		208,000		471,500		415,063		534,980		393,707		5 345,000		310,723		319,684		194,651		179,421
Graphite { amorphous short tons	10,853	103,175	38,803	195,821	1,449	79,380	8,068	32,328	1,407	39,710	1,223	32,415	2,082	33,894	3,540	39,436	1,733	38,780	1,181	13,358
{ crystalline pounds	5,567,203	233,054	4,647,840	171,149	2,988,000	119,940	6,284,400	219,371	5,990,203	295,723	4,790,000	226,000	5,843,771	187,680	5,264,727	234,226	5,220,530	238,356	7,074,370	417,273
Grindstones and pulpstones		744,894		886,082		836,063		804,051		788,994		807,316		816,339		893,677		893,345		949,479
Gypsum short tons	1,840,540	3,837,975	1,751,748	4,043,264	1,731,830	4,079,994	2,221,785	5,906,738	2,378,957	6,023,039	2,233,970	6,682,038	2,800,787	8,083,008	2,999,809	8,774,833	2,479,566	6,855,000	3,547,011	9,890,803
Lime do	5,108,087	13,480,833	5,092,594	13,850,705	3,766 873	11,091,186	5,484,074	15,846,072	5,805,934	14,060,050	5,399,918	13,080,054	5,809,463	13,970,114	5,980,000	14,640,000	5,980,000	15,288,000	5,980,000	14,339,736
Lithium minerals do	383	7,411	830	11,000	263	1,850	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)
Magnesite (crude) do	7,805	33,515	7,361	32,983	6,387	19,781	9,485	37,360	12,643	74,936	6,275	75,000	10,512	84,096	9,993	77,006	11,393	134,223	30,466	274,491
Marls do	19,104	7,341	14,091	5,429	6,169	4,330	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)
Mica { scrap do	1,489	92,743	2,035	43,800	2,417	33,804	4,060	46,047	4,063	53,253	3,813	45,353	3,389	49,073	3,333	39,843	3,720	51,410	3,939	59,510
{ sheet pounds	1,423,100	332,348	1,000,182	249,211	872,964	204,031	1,809,532	334,488	2,476,100	383,833	1,897,501	310,254	849,485	282,823	1,700,877	330,812	580,902	276,540	550,811	279,259
Millstones		46,890		51,741		31,420		23,983		28,317		43,089		71,414		56,186		43,316		33,480
Mineral paints { natural pigments (c) short tons	82,989	528,076	82,139	526,263	80,403	493,900	80,230	467,028	82,823	527,798	82,782	493,811	74,697	561,093	76,796	593,330	67,845	491,888
{ zinc and lead pigments (m) do	90,799	7,639,107	98,311	8,230,335	79,183	6,646,383	87,525	7,062,333	78,102	6,589,804	80,611	7,242,782	109,497	9,507,896	97,373	9,020,996	106,791	9,978,710	141,383	14,262,461
Mineral waters gallons sold	49,108,260	8,028,357	52,060,260	7,231,903	55,888,820	6,712,580	54,674,480	6,804,134	62,030,123	6,257,900	62,738,553	6,857,666	63,251,201	6,918,671	57,867,200	6,831,291	54,338,466	4,802,228	52,113,503	5,126,794
Natural gas		48,873,998		54,232,229		54,640,374		63,208,941		70,758,159		74,631,534		84,583,027		87,840,677		94,118,524		101,219,281
Oilstones, etc		208,070		204,183		217,284		214,019		268,694		214,291		232,219		207,240		187,648		118,179
Peat						133,000		127,065		140,208		272,114		238,073		197,200		209,693		238,527
Petroleum barrels (42 gallons)	100,493,936	93,544,725	166,095,233	130,156,749	178,527,355	139,079,184	183,170,874	128,228,637	209,557,243	127,890,626	220,443,231	154,044,732	222,238,044	164,312,247	248,440,230	227,121,288	265,762,530	214,132,218	281,104,104	178,493,200
Phosphate rock long tons	2,080,067	8,379,427	2,288,242	10,083,556	2,066,126	11,308,134	2,332,264	10,796,456	2,664,066	10,917,000	2,052,270	11,800,602	2,272,325	11,675,774	2,111,221	11,796,231	2,734,043	9,808,041	1,852,697	8,413,449
Pumice short tons	12,200	16,750	9,119	23,815	10,569	20,287	19,100	33,439	23,271	64,042	21,680	56,200	27,140	56,267	24,000	56,000	27,091	59,173	27,709	63,195
Pyrite long tons	301,432	931,908	347,297	794,949	223,566	487,112	247,070	1,058,187	241,812	977,978	201,448	1,104,871	280,028	1,304,330	241,236	1,086,084	230,080	1,083,240	230,131	1,074,023
Salt barrels (280 pounds net)	28,172,380	6,858,350	29,704,128	7,608,323	26,802,062	7,849,633	30,107,648	8,943,831	32,305,536	7,900,344	31,152,966	8,549,992	33,234,808	9,670,773	34,290,288	10,102,139	34,804,982	10,107,417	38,331,496	11,767,000
Sand- { glass short tons	1,089,530	1,309,788	1,187,396	1,350,067	1,063,853	1,134,800	1,104,481	1,162,376	1,481,089	1,816,711	1,598,066	1,843,733	1,488,880	1,630,671	1,791,800	1,985,901	1,510,939	1,908,000	1,864,004	1,806,940
{ molding, building, etc., and gravel do	31,842,972	11,480,490	40,864,632	12,342,002	36,126,491	10,130,433	38,401,100	17,173,615	67,940,347	19,830,019	63,008,100	19,614,855	86,889,175	21,082,727	77,764,049	23,231,517	77,009,086	23,378,969	76,719,394	21,514,977
Sand-lime brick		1,170,009		1,326,700		1,020,000		1,150,560		1,169,183		897,664		1,200,823		1,236,235		1,068,313		1,138,104
Silica (quartz) short tons	90,779	304,083	39,192	223,801	47,316	180,157	133,469	240,468	63,977	193,787	57,943	185,132	97,874	191,085	97,802	201,488	153,451	300,303	110,578	273,563
Slate		5 2,068,346		6,016,200		6,316,817		5,541,415		5,238,780		5,738,019		6,043,013		6,173,476		5,706,797		4,993,915
Stone		66,379,794		71,105,903		69,712,460		71,349,196		78,820,584		77,199,657		78,192,800		83,782,000		5 77,944,103		79,940,282
Sulphur long tons	204 153	5,096,678	202,106	5,143,850	388,444	6,068,315	339,312	4,632,083	285,334	4,805,113	360,064	4,767,000	303,672	5,356,432	311,500	5,479,949	257,824	5,884,200	(c)	(c)
Sulphuric acid (60° Baumé) from copper and zinc smelters short tons											438,500	3,753,696	614,072	4,240,941	632,037	4,365,273	760,628	5,180,262	5 904,853	7,231,241
Talc and soapstone (exclusive of Shasta talc) do	58,972	874,286	72,010	908,047	46,615	702,832	61,802	903,036	79,006	984,312	51,531	1,023,722	92,412	1,050,052	94,138	1,119,567	86,281	1,042,501	98,577	1,038,730
Talc, Shasta do	61,673	857,300	67,800	936,000	70,739	997,350	48,536	939,857	71,710	792,180	63,080	615,280	69,857	656,270	81,756	796,500	86,078	931,000	88,514	864,843
Thorium minerals (monazite), and zircon pounds	347,275	132,560	548,153	65,800	432,046	50,719	542,031	65,283	50,201	12,006	2,208	800								
Total value of nonmetallic products		1,016,360,019		1,169,748,197		1,043,760,454		1,151,819,951		1,041,099,969		1,265,145,078		1,277,189,780		1,339,317,710		1,422,040,500		1,080,503,000
Total value of metallic products		660,170,931		904,082,301		580,744,068		734,910,809		749,870,334		660,908,939		966,201,073		952,222,018		691,091,734		992,910,883
UNSPECIFIED. o																				
Metallic and nonmetallic (estimate)		300,000		100,000		250,000		300,000		300,000		330,000		300,000		400,000		470,000		5 7,480,000
Grand total		1,900,760,950		2,089,941,398		1,624,004,522		1,886,730,760		1,991,210,303		1,926,384,017		2,244,023,853		2,430,189,728		2,118,200,233		2,203,821,941

a From both domestic and foreign ores.
b From all sources. Value excluded from metallic totals as the values of the antimony contained in antimonial lead are included in the antimonial lead values and the remainder under "Unspecified."
c Value included under "Unspecified."
d Product from domestic ores only.
e Ferroalloys included in pig iron prior to 1911. Statistics of output prior to 1912 were furnished by the American Iron and Steel Association. Ferroalloys include ferromanganese, spiegeleisen, ferrosilicon, ferrophosphorus, ferromolybdenum, ferrotitanium, ferrotungsten, and ferrovanadium.
f Value, $20.67163462333 an ounce.
g Value not included in total value.
h Exclusive of those ores from Lake Superior district running so low in manganese as to be classed with iron ore.
i By-product in electrolytic copper refining.
j Figures for 1914 revised in 1915.
k Includes brown coal and lignite, and anthracite mined elsewhere than in Pennsylvania.
l Exclusive of considerable production for special uses which is included under "Unspecified."
m Natural pig, paste color, umber, sienna, metallic paint, mortar colors, and ground slate and shale. Zinc and lead pigments: sublimed blue lead, sublimed white lead, leaded zinc oxide, zinc oxide, and zinc lead.
n Includes 30,189 tons of stronger acid, reported as chrom, etc., not converted to 60° Baumé.
o Includes in 1913 antimony other than content of antimonial lead, bismuth, cadmium metallic, diatomaceous earth for special uses, lithium minerals, magnesium, mark, nickel content of hydrous nickel sulphate, potash salts as kainite, salts, steel and soapstone. Hourly pounds, sulphur, and an estimate of the value of miscellaneous mineral products not collected annually by the Survey.

The output of secondary spelter redistilled at regular smelters and at the smelters with large retorts was about 32,000 tons. It is probable that the output of remelted spelter was not less than that of the preceding year, 23,000 tons, which would give a total of 55,000 tons of secondary spelter. Adding this to the production of primary spelter gives a grand total of 713,000 tons of spelter made in the United States in 1916.

The production of primary spelter from both domestic and foreign ores, apportioned according to the States in which it was smelted, by six-month periods, was as follows:

Spelter Production, 1915-16, by States, in Short Tons.

State.	1915 First half.	1915 Second half.	1916 First half.	1916 Second half.
Illinois	74,982	84,976	90,082	90,268
Kansas	35,247	66,176	74,592	65,924
Oklahoma	51,172	58,036	73,298	90,790
Other States	55,131	63,799	78,480	95,054
	216,532	272,987	316,452	342,036
	489,519		658,488	

LARGEST INCREASES IN EXPORTS OF SPELTER AND BRASS.

Exports of spelter and sheets made from domestic ore are estimated at 167,000 short tons, worth $52,200,000, compared with 118,603 tons, worth $29,537,680, in 1915. Exports of spelter made from foreign ore are estimated at 43,500 tons, valued at $7,500,00, compared with 13,720 tons in 1915. The exports of zinc manufactures fell off to $573,000 in 1916, from $2,173,089 in 1915. The exports of domestic zinc ore were about 78 short tons, valued at $3,992, compared with 832 tons in 1915.

The imports of spelter (mostly scrap, probably) are estimated at 600 short tons, valued at about $100,000, compared with 904 tons in 1915. Zinc dust was imported to the amount of 900 tons, worth $330,000. The imports of zinc ore in 1916 were approximately 371,000 short tons, containing about 140,000 tons of zinc and worth about $11,800,000, compared with 158,852 tons of ore, containing 57,669 tons of zinc, in 1915. The zinc imports for the first ten months of 1916 oreginated as follows:—

Imports of Zinc Ore, January-October, 1916, in Short Tons.

Country.	Ore.	Zinc content.	Value.
Canada	17,899	7,195	$455,754
Mexico	139,503	43,096	5,368,113
France	3,884	1,422	56,542
Spain	49,769	20,541	1,385,035
Italy	12,550	5,783	394,782
French Africa	2,464	1,152	73,564
French East Indies	1,653	746	55,407
China and Hong Kong	9,541	4,589	344,192
Australia	94,684	41,707	2,574,476
Other countries	841	265	20,001
	352,988	126,476	$10,728,466

Domestic Consumption Increased; Stocks Reduced.

The apparent domestic consumption of spelter in 1916 may be computed as follows:—The sum of the stock on hand at smelters at the beginning of the year, 14,253 tons, plus the imports, 600 tons, and the production, 658,000 tons, gives the total available supply—672,853 tons. From this are to be subtracted the exports of domestic spelter and sheets, 167,000 tons, the exports of spelter made from foreign ore, 43,500 tons, and the stock on hand at smelters at the end of the year (to be exact, on December 15), 17,300 tons, or a total of 227,800 tons, leaving a balance of 445,000 tons as the apparent domestic consumption. This calculation takes no account of the stocks of spelter held by dealers or consumers. On comparing the consumption in 1916 with the 364,382 tons consumed in 1915 and the 299,130 tons consumed in 1914, it appears that the indicated consumption is large, because the exports of brass and manufactures of brass were large.

The stock of spelter at smelters on December 15 shows a reduction of 6,500 tons when compared with the 23,879 tons shown by the midyear figures

The price of spelter at St. Louis at the beginning of 1916 was 17.2 cents a pound. By the middle of February it had risen to 20.9 cents a pound, the high point of the year, after which it dropped sharply to 16.5 cents by the middle of March, but rose quickly again to 19½ cents at the middle of April. Then began a long sharp decline which brought the price to 8.8 cents a pound at the middle of July. A recovery to 10.7 cents was followed by a drop of 8.4 cents on August 10, the lowest price of the year. By fits and starts the price rose to 13.2 cents a pound at the end of November, after which it gradually declined, closing the year at about 10 cents a pound. The average price for the year for immediate delivery at St. Louis was 13.7 cents a pound, compared with 14.2 cents a pound in 1915 and 5.1 cents in 1914.

London Spelter Prices.

The price of spelter in London was uniformly about 2 cents a pound higher during the year than at St. Louis. For a few days in the latter part of November the London price was lower than the St. Louis price. The price at London opened at £90 a long tone (19.6 cents a pound) and after sagging slightly through January rose sharply to £111 a ton (24.1 cents a pound) at the beginning of March. This exceeded the maximum price for 1915, which was £110 a ton (23.8 cents a pound).

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FEDERAL ACTIVITIES AND DEVELOPMENTS IN REPORTER MARKETS.

What Has Been Accomplished During the Year by Congress and the Departments of the Government in the Petroleum, Drug, Dyestuff, Fertilizer, Naval Stores and Similar Fields.

DUTY ON DYESTUFFS AND GOVERNMENT'S DYE LABORATORY MARK YEAR'S PROGRESS

Issuance of First Dyestuffs Census by Dr. Norton and Elimination of Important Statistics at Request of Foreign Manufacturers Two Important Features.

LONG strides toward the development of an American dye industry were made during the last year. The very great need of the development of such an industry, which became apparent soon after the outbreak of the European war, in 1914, continued to make itself felt during 1916. It is true that a comparatively small quantity of dyes were brought here from Germany for the use of the trade by means of the German submarine Deutschland, and by the consent of Great Britain and the Allies, shipments of dyes from Germany for the use of the United States Bureau of Engraving and Printing, where paper money and stamps are made, reached this country. Nevertheless, the amount of dyestuffs so imported was infinitesimal compared to the quantity which the trade requires under normal conditions.

American capital, therefore, has turned more and more to the manufacture of dyestuffs during the last year and the output has been increasing rapidly. The quality of the American dyes also has been greatly improved. The great question, however, in connection with the infant dye industry, is whether it can survive a return of normal conditions when it must compete with the dyestuffs from Germany.

Protective Tariff on Dyestuffs.

In order to encourage the dye industry a Democratic administration and a Democratic Congress forsook the ancient opposition of the party to protective tariffs. A law was enacted taking many of the coal-tar dyestuffs and indigoes from the free list and placing protective duties on them. It is true that some of the advocates of a protective tariff for dyestuffs insisted that the duties so imposed were not large enough to give adequate protection to the American dye manufacturers. They predicted that with the close of the war the German dyestuffs would soon pour into this country, even with the new duties imposed, in such quantities that the American dye manufacturers would be pushed to the wall. However, the supporters of the industry believe that the new duties are an entering wedge and that they will be increased, if it is found necessary to protect further the American dye factories.

Representative Hill of Connecticut, a Republican member of the House Ways and Means Committee, which handles all the tariff laws, made a strong effort to have higher duties imposed when the tariff law was before the House. In the Senate, Senator Smoot of Utah and Senator Lodge of Massachusetts, also endeavored to have the rates increased, but without avail.

Bureau Investigation of Industry.

The government, in addition to enacting a law to protect by tariff duties the American dye industry, made provision for an investigation into the manufacture of coal-tar and other dyestuffs by the Bureau of Chemistry of the Department of Agriculture, with the idea that the information so obtained should be used to aid the American manufacturers. For this purpose Congress appropriated $50,000 and it is expected that a similar sum will be appropriated in the new year.

Another step taken by the government to aid the dye manufacturers was the compilation and publication of a dyestuff census by the Bureau of Foreign and Domestic Commerce of the Department of Commerce. This census, which is of very great value to the dye manufacturers, since it indicates what dyestuffs and in what quantities are required by the American trade, was compiled by Dr. Thomas H. Norton. When the proofs of the dye census were first made public, however, the importers in New York of German dyestuffs and the representatives of German manufacturers protested vigorously against the publication of the census, charging that it revealed many business secrets and that those business secrets were entitled to protection. Notwithstanding the fact that the American dye manufacturers and chemists strongly urged the publication of the census as originally written, Secretary Redfield of the Departmtnt of Commerce finally ordered that those portions of the census to which the importers and German manufacturers objected, be stricken out. And so the census was finally published with much of the valuable detailed information eliminated.

That the importers of foreign dyes and the representatives of German manufactures were able to bring such strong influence to bear, resulting in the emasculation of the dye census, was greatly regretted by the American chemists and dye manufacturers generally, who contended that the American industry was entitled to all the facts contained in the original census to aid in building up and developing its business. Herman A. Metz, engaged in the dyestuffs trade, former Democratic member of the House of Representatives, was one of the protestants against the publication of the dye census.

Matter Eliminated from Census.

The action of Secretary Redfield in issuing the order to eliminate from the census of dyestuffs certain details to which objection was made by the dye importers, was taken in spite of very earnest protest by American manufacturers and chemists. The important data eliminated showed in detail the amounts and values of dyestuffs manufactured and imported into this country from abroad. The information contained in the "Census" was obtained from the Customs House, taken from the public records, yet German-American importers insisted that their business secrets would be revealed if these figures were published. The American manufacturers were very desirous to have this information because it would enable them to know just what quantities of various qualities were needed by the trade in this country in their varying shades. This information, they contended, would enable them to work intelligently in the development of the American industry.

When Congress met in December, Senator Hughes of New Jersey intended to offer a resolution calling upon the Secretary of Commerce for the dye census as originally written for the purpose of having it published as a Senate document. He later changed his mind, however, and failed to introduce such a resolution. He gave as his reason that so far as he knew the American manufacturers were not interested in the matter. However, Senator Hughes heard directly from the men who were opposed to the publication of the census, including Mr. Metz. What they had to say undoubtedly caused him to change his mind. It has been intimated in other quarters, however, that a fight still may be made in the Senate or the House to have the original dye census published.

Conversion of Explosive Plants.

The great plants which have been constructed in this country for the manufacture of explosives to be used in the European war may be converted into factories for the production of dyestuffs, it has been strongly intimated.

In October it was announced that two of the largest manufacturers of explosives in the country were planning to turn their auxiliary plants, erected to meet the rush orders for explosives for European armies, into dye works as soon as the war is over and normal conditions in the explosives trade have returned. Dr. Thomas H. Norton, dye expert of the Department of Commerce, urged upon these companies, The Dupont Company and the Aetna Explosives Company, the wisdom of converting their auxiliary plants into dye factories to meet the needs of the users of dyes in this country and at the same time to prevent these plants from going to the junk heap at the close of the war.

Few Changes Necessitated.

Few changes will be necessary to bring about the manufacture of dyestuffs instead of war munitions, for the raw materials and the intermediates from coal-tar chemicals used in manufacturing explosives, are the same as those used in manufacturing colors. It is expected that manufacturers of explosives in converting their plants into dye establishments will start with the manufacture of the heavy staple dyes. It has been suggested that they content themselves with making the intermediates at the start and thus furnish raw materials for the American dye manufactures to turn out the colors. It is believed that the entry of the explosives manufacturers into the field of dyestuff manufacturers will aid greatly in the firm establishment of the American dye industry. In the first place, the explosive plants will enter the dye industry after having paid for themselves long before the manufacture of munitions for the warring powers was ended. Thus the charges of constructing dye works will have been eliminated and the manufacturers will have only to consider the cost of producing the material. In fact, in many of the contracts with foreign governments the companies now producing explosives included the cost of erecting their plants.

These manufacturers of explosives have had hundreds of chemists at work experimenting for them and it has been predicted that, given a free hand to delve into the manufacture of coal-tar dyes, these chemists will be able to produce colors that will equal any that have been imported.

Dyestuffs Schedule a Compromise.

The dyestuffs schedule in the new revenue law was drafted only after months of consideration, in which conflicting interests played their part. The result was in large part a compromise measure, which met neither the demands of the chemists of the country nor the demands of many large users of dye materials. The law as finally drafted placed no duty, generally speaking, upon basic dye materials. It did place, however, a duty on intermediates of 15 per cent. ad valorem and 2½ cents specific duty per pound. The duty on completed dyes was 30 per cent. ad valorem and 5 cents specific duty per pound, with the exception of natural and synthetic alizarin and dyes obtained from alizarin, anthracene and carbozol; natural and synthetic indigo and all indigoids, whether or not obtained from indigo. The last will pay a duty of 30 per cent. ad valorem, but will be exempt from the specific duty to 5 cents per pound. The specific duty at 5 cents per pound was placed on indigo and alizarin by the Senate, but the House, led by Representative Kitchen of North Carolina, in whose State one of th largest users of indigo in the country is to be found, refused to agree with this increase. A strong effort was made by some of the Democratic Senators to insert a provision in the law to render the tariffs on dyestuffs ineffective until the close of the war, or until the President of the United States should announce that normal conditions in regard to the dye trade had been resumed. The argument was that with the German supply almost entirely cut off by war conditions there was no need of a tariff barrier at this time. This effort, however, was defeated and the dye manufacturers in this country were given the assurance of immediate protection. There was a string, however, tied to these protective duties, which provided for gradual reduction of the duties during a period of five years beginning five years after the passage of this law. The President also is given authority to put an end to the protective tariff duties if he finds that there is not being manufactured or produced within the United States as much as 60 per cent. in value of the domestic consumption of dyestuffs.

Provision for Gradual Reduction.

Congress inserted a provision for the gradual reduction of the dyestuffs tariffs on the ground that after the industry has once been firmly established, such protection may not be required. There was an effort by some of the "dyed in the wool" anti-protectionists, including Senator Underwood of Alabama, to strike the dye schedule in its entirety from the law. But the Democratic administration having gone on record in favor of doing something to aid the dye manufacturers, the supporters of the President in Congress refused to be guided by the strict anti-protectionists.

At the close of the old year it was recognized, and in fact really admitted by administration leaders in Congress, that additional revenue legislation would have to be enacted to meet the deficit which is staring the Federal treasury in the face and which may run as high as $300,000,000 by the close of the next fiscal year. This deficit, the Democratic leaders insist will be due entirely to the tremendous appropriations which are being made for the army and navy and national defense. If they open up the tariff schedules again, another attempt will be made to have the duties on dyes still further increased.

The Bureau of Chemistry of the Department of Agriculture has entered upon its study of the problems of dye manufacture. While it may be some little time before results are forthcoming, Dr. Alsberg, the chief of the bureau, has expressed the hope that the experiments conducted by the bureau will prove of value to the dye industry. The $50,000 which has been provided for these experiments, and which it is expected will be provided in the new law, is considered only an entering wedge if the bureau finds that it is able to do valuable work in the assistance of the dye industry. In that event much larger appropriations may be expected in the future. Experiments will be conducted in dyestuffs production at a laboratory especially constructed on property owned by the Department of Agriculture in Virginia near Washington.

During the year the Bureau of Chemistry prepared a report on American sumac to aid the farmers in gathering this plant and help supply the demand in the dyeing and tanning industry. The bureau also investigated the matter of denaturing egg yolks for tanning and found that the best method is to add 2 per cent. of birch tar oil. Power distillate may also be used.

United States Bureau of Printing Importations.

During the year the question rose as to why the United States Bureau of Engraving and Printing, which makes all the paper money and the stamps in this country, did not purchase all of its dyes from American manufacturers. If the government was interested in establishing firmly the American dye industry, why, then, could not the government give the manufacturers the benefit of its own trade in these materials? Yet, instead of making purchases from American manufacturers, the bureau turned to the German dyes for reds and blues, although it did purchase yellow and blacks from the American producers. In order to enable the bureau to obtain these German dyes the State Department was forced to take the matter up with Great Britain, and finally obtained consent of that government and the other allies to have shipped to this country from Germany the dyes required by that bureau.

Director Joseph E. Ralph of the Bureau of Engraving and Printing has declared that he is not only willing to purchase dyes made by American manufacturers, but that he has been making constant effort to get colors and that he would buy large quantities of reds and blues if he could get them here. He has made frequent appeals for colors during the last two years to the American manufacturers, he said, but without results. He gave it as his opinion in discussing this matter that there were not 1,000 pounds of reds in the States that the bureau could use. He said that the only color which the bureau was certain of obtaining in this country was black; that the bureau made its greens by mixing blue and yellow, and that he was at that time obtaining all the yellow he required in this country.

As for the reds and blues, Mr. Ralph pointed out that the prices for the American reds were so far in excess of those charged for the German colors that the government could not afford to make its purchases here, even if the desired colors could be obtained.

He contended that to obtain American reds of the same strength as the German would cost in the neighborhood of $8 per pound against 35 cents for the German product. But even with the higher prices and perhaps inferior colors Mr. Ralph asserted that he would be willing to purchase American reds if he could get them.

Dr. Norton Opposes Ralph's Views.

Dr. Thomas H. Norton, the dye expert of the Department of Commerce, on the other hand, took the view that American manufacturers of colors can produce dyes equal to those of Germany. American chemists, he said, are perfectly able to manufacture any of the staple lakes and pigments currently employed by the Bureau of Engraving and Printing, identical with the highest grade of German and Swiss colors, chemically, physically and tinctorially.

He said that the American dye factories were equipped with the necessary machinery for producing every one of the principal pigments required. Dr. Norton asserted that the inability of the government bureau to purchase the few coloring matters so essential to maintain their standards of uniformity in producing the securities and stamps of the government was due to the absence of the elasticity in the methods of obtaining supplies for the government. He said that the government authorities are prevented from adapting themselves to emergencies and abnormal trade conditions with the

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same ease and swiftness which characterize the purchasing agencies of large manufacturing concerns. He pointed out that in private concerns using dyestuffs, if the price of colors is vastly increased, the price of the finished product may be increased also, and the adjustments between the purchasing, manufacturing and selling divisions may be readily made. Such rapid adaptations are rarely within the power of government officials except in the case of active military operations.

He pointed out that the government had started on the same plane as scores of other consumers of colors, and that the entire output of various colors from certain firms may be mortgaged for months ahead at prices far beyond the limits of the appropriation allowed the government bureau by Congress. That the American chemists are capable of producing blues and reds equal to those produced in Germany was the confident assertion of Dr. Norton.

Practical Tests of Government Colors.

The announcement was made by Director Ralph of the Bureau of Engraving and Printing that he had arranged with Dr. Alsberg, chief of the Bureau of Chemistry of the Department of Agriculture, to give a practical test of all the colors produced in the government dye laboratory, for which the government appropriated $50,000 a year, last year. In this way the means for trying out practically the products of the laboratory will be found. Also, it is the hope of Director Ralph that through the experimental work of the Bureau of Chemistry in this laboratory it may be possible to develop an exclusive color for the use of the government in printing its securities, which, in respect to color, will be similar to the distinctive paper now used by the government in making its paper money. Such a distinctive color may be obtained, in the opinion of Mr. Ralph, through a secret process which it would be impossible for private enterprises to imitate. He would further protect such a distinctive color by recommending the passage of a law which would prevent its manufacture or use, just as law prevents the use by private persons of distinctive paper upon which government securities are printed.

While the Bureau of Chemistry is perfectly willing to have its experiments and colors made use of by the Bureau of Engraving and Printing, Dr. Alsberg, the chief of the Bureau of Chemistry, has made it clear that the bureau's laboratory to experiment in the making of dyes is essentially an experimental plant and not intended in any manner to supply the government with all the dyes it may require. In other words, it is not to be regarded as a competing factor in the American dye industry, but merely an aid to that industry.

Other departments of the government have been handicapped during the last year in purchasing dyes, among them the Navy Department. The foreign supply of slate color dye, used before the war to dye fire hose aboard warships, was cut off, and the domestic dye used, the navy officials contend, was of uncertain quality. Difficulty was experienced also in getting color for uniform cloth, both woolen and cotton fabrics. With the growing scarcity, the prices of blue uniform dyes rapidly increased, and where the dye used in flannel cost 10 cents before the war it went up to 70 and 80 cents.

Increase in Barytes Production.

The United States is producing barytes in increasing quantities, used in the manufacture of colors, according to reports submitted in November last by the Bureau of Foreign and Domestic Commerce of the Department of Commerce. The marketed production of crude barytes in the United States in 1915 was 108,547 short tons, valued at $381,000. This is a notable increase over the quantity produced in 1914, which was 52,747 short tons, valued at $155,000. The increase was in a large part due to the activity in the mines in Georgia, Kentucky and Tennessee. The price paid for crude barytes was higher in 1915 than in 1914, and still higher in 1916. Alaska shipped its first barytes in 1915. The general feeling of the trade was that the barytes boom is not to be short-lived, particularly in view of the large demand for crude barytes by the newly established barium chemical industry.

Although the British Government and the Allies have permitted the shipment of colors from Germany for the use of the Bureau of Engraving and Printing, they put an end to the shipments of dyestuffs from Germany for commercial purposes in this country. The statement by Lord Robert Cecil in the House of Commons to the effect that the object of Germany's desire to export dyestuffs was to keep up German exchange in America was the explanation advanced for this action on the part of Great Britain. The British Government would not consent to exports of dyestuffs from Germany to the United States, aggregating from $15,000,000 to $30,000,000 in value a year, it was said.

HIGH COST OF GASOLINE AND SEARCH FOR SUBSTITUTES FEATURE OF YEAR'S WORK

Controversy Over Naval Fuel Oil Reserves, Efforts Toward Standardization of Gasoline, and Gasoline Investigation Also Prominent Factors in Review.

Washington, Jan. 20, 1917.

THE petroleum industry of the United States during the last year was marked by a tremendous production and by high prices obtained, particularly for gasoline. The constantly increasing production and use of oil gave rise to warnings on the part of the government bureaus that the supply of crude petroleum must be conserved. The increase in prices of gasoline particularly led to many demands by members of Congress and persons using gasoline for an investigation into the causes of the rapid increase in prices. The Secretary of the Interior, in his annual report for the fiscal year ending June 30, 1916, pointed out that in the calendar year 1915 more than 281,000,000 barrels of petroleum, valued at $180,000,000, had been produced in the United States, or more than 65 per cent. of the total output of the world. He estimated that even at the present rate of consumption the underground supply of oil in this country would last only twenty-seven years. The great necessity of adopting methods by which the available supply of oil and gas may be recovered and utilized with greater efficiency was apparent, he said.

Demonstration of Rittman Process.

The so-called Rittman process of producing gasoline from crude petroleum was demonstrated during the last year by the Bureau of Mines. Several commercial plants were using the process during the year, nineteen companies having received licenses to manufacture gasoline and five to manufacture benzene-toluene by the Rittman process. The adoption of the Rittman process, the government officials believe, will enormously reduce the cost of gasoline, since, they say, it will produce a vastly increased amount of gasoline from the same amount of petroleum.

General Leasing Bill.

Strong efforts have been made by members of Congress from the Western States containing public lands of vast area under which great quantities of petroleum are said to be located, for the enactment into law of a general leasing bill which will bring about the development of these resources now lying idle. Such a general leasing bill passed the House, providing for the leasing on a royalty basis of coal, oil, phosphate and sodium mineral lands, now owned by the United States. Strong opposition to the leasing bill developed in the Senate just as it did in the Sixty-third Congress. Many of the Western Senators contended that the lands should be open to entry by the government, just as they had been in the past, and that the government should not seek to build up a great leasing system with the evils of bureaucracy which were sure to follow. The opposition was so strong in the Senate that the provisions for the leasing of coal lands were eliminated entirely from the bill. The remainder of the bill was amended by the Senate Public Lands Committee and reported to the Senate. But in this redrafted bill, provisions had been inserted to grant a certain amount of relief to the oil operators who had entered upon the naval oil reserves, Nos. 1 and 2, in California, in good faith prior to the withdrawal of those lands and had prosecuted their work to the discovery of oil.

The Navy Department and conservationists generally, led by Gifford Pinchot, immediately attacked this proposed remedial legislation. So strong was their opposition that during the remainder of the year action on the bill was prevented in the Senate. Congress has only until March 4 to finally enact ths general leasing law, or else the bill will die and the work of legislation on this subject must be begun all over again in the next Congres.

Osage Land Leasing.

During the course of the year the Secretary of the Interior finally settled the matter of the renewal of the important Foster leases in the Osage oil lands in Oklahoma.

The Bureau of Mines was given $135,000 for the investigation of mineral fuels and unfinished mineral products belonging to or for the use of the United States. The same bureau was given $70,000 for inquiries and investigations concerning the mining, preparation, treatment and utilization of petroleum and natural gas with a view of economical development and conservation of these resources through the prevention of waste. The Attorney-General was given $65,000 to enable him to handle suits effecting the withdrawn oil lands.

Standardization of Gasoline.

The Bureau of Standards of the Department of the Interior gave much attention to the question of the standardization of gasoline. This important question is still under consideration and the bureaus are both hopeful that some adequate method of standardizing gasoline will be developed during the coming year.

Investigation into the price of petroleum and gasoline, the control of such prices and the operation of pipelines have been under way during the last year by various government departments and bureaus, including the Department of Justice, the Interior Department and the Federal Trade Commission. As a matter of fact, the report from the Federal Trade Commission on this question has been awaited by Congress and the public for practically the entire year, a resolution having been adopted by the Senate in the last Congress providing for just such an investigation by the Trade Commission. From time to time reports have emanated from the Trade Commission that this report was to be forthcoming. In fact, a preliminary statement was issued. But the final report was still held up at the close of the year.

The report of the Federal Trade Commission has been much revised. In its early drafts, numerous inferences of wrongdoing by the Standard Oil Companies were drawn and charges made of discriminations and violations of the anti-trust law. The commissioners, however, went carefully into these charges and were unable to discover testimony that would substantiate them and so they were eliminated, it was reported.

Preliminary Gasoline Report.

The preliminary report of the Federal Trade Commission upon its investigation of gasoline prices was sent to Congress in April. This preliminary report told in a general way the scope of the investigation. It showed that the following steps were being taken in active conduct of the investigation:—

First, crude oil production was being studied and the most accurate information available concerning quantity of production, storage and prices were being gathered.

Second, refiners making over 95 per cent. of the total production of the country were reporting upon their gasoline business for each month of the year 1915, including the quantity purchased, the quantity produced and the quantity sold and the quantity in stock, prices received f. o. b. refinery and at tank wagon stations. In its investigation of causes the commission announced that it was considering both domestic and foreign conditions and was weighing every factor to detect any artificial or manipulative element. It also stated that a letter of inquiry had been sent to every manufacturer of automobiles, farm tractors and other gasoline engines in the country to ascertain as far as possible the output of their products and the effect of the advance in gasoline prices upon the demand for their products and upon the consumption of gasoline.

The commission said that in response to the resolution adopted by the Senate in the sixty-third Congress the commission was conducting a general investigation of the petroleum industry in such a way as to ascertain, if possible, the exact relation between the several companies into which the Standard Oil holding company was resolved in 1911, and that it was expected the gasoline investigation would throw light upon this question.

The commission pointed out that there are no reliable published statistics concerning the production and stocks of crude oil, nor any recent data regarding output, sales and consumption of such finished products as gasoline. Consequently it had found it necessary to make extensive statistical preparation by means of correspondence schedules and field work.

In this investigation the commission announced the Department of Justice and the Federal Trade Commission were cooperating to avoid duplication of work and to bring about co-ordination in results. It was agreed that the Federal Trade Commission should continue its investigation of petroleum, and in connection therewith also investigate specific complaints, filed with the Department of Justice. The complaints filed with the Department of Justice, therefore, were sent to the Federal Trade Commission and were examined into in connection with the general investigation.

Production 307,947,000 Barrels in 1915.

Tentative tables showing the production of crude petroleum in the United States in 1915 were given in the preliminary report. They showed that in all fields the production was 307,947,000 barrels. Another table showed that the estimated gasoline content of the crude petroleum produced in 1915 for all fields was 1,892,503,140 gallons, while another table showed the stocks of crude petroleum held by pipeline companies and producers at the end of each month in 1915. In a fourth table differentiation was made between Standard Oil and other refineries as to the classification of the stocks of crude oil on hand at refineries reporting to the Federal Trade Commission on January 1, 1915, July 1, 1915, and January 1, 1916. Other tables dealt with the classification for amounts of gasoline produced, purchased and sold and stocks on hand the first of each month, the prices each month at refineries and at the tank wagons.

Secretary Lane's Report.

As early as last February the Secretary of the Interior submitted a report to the Senate in response to a resolution offered by Senator McCumber of North Dakota, calling upon the Secretary to furnish the Senate information as to the production, consumption and prices of gasoline. The report of the Secretary went very exhaustively into these questions. It showed that the gasoline produced in 1899 was 6,780,000 barrels and that the production in 1915 was 41,600,000 barrels. The consumption has increased, according to the report, in practically the same ratio wth its production. The report stated, however, that it was conservatively estimated there was a surplus of 2,000,000 barrels of gasoline stocks in storage January 1, 1915, which was reported as practically exhausted on January 1, 1916.

The report asserted that the selling price of gasoline is fairly responsive to the supply and demand for gasoline, but that it is less directly related to the supply of crude oil. It asserted also that the evidence at least suggests that increasing profits to the larger refining corporations have accompanied the upward trend of gasoline prices. The report stated it was obvious that the refining and transporting companies that are strongest in business foresight and financial backing take advantage of both the falling and the rising markets in crude oil to strengthen an already strong position by purchasing both stocks of crude oil and producing properties. Under these conditions a market shortage of crude may develop which is not wholly warranted by facts of actual production, yet it no less surely leads to higher prices in both crude and refined products. This furnishes the opportunity for the well-supplied refiners to sell at the higher price gasoline which is derived from crude oil purchased in the lower market.

Gasoline Selling Prices.

The net result of this clearly indicated business policy, it was held, is that the consumer of gasoline pays a price which in the case of the companies controlling the larger stocks of crude oil is not necessarily determined by the price paid to the producer for the oil from which the gasoline is obtained. The smaller refiners on the contrary, less favored with transportation and storage facilities and ready capital, may be so dependent for crude oil upon the current market that their cost of gasoline production is directly related to the current price of crude oil if indeed they do not have to pay a premium whenever a shortage is threatened. This advantage of larger profits to the stronger companies is perhaps inherent in the competitive system and must be recognized in any analysis of cost and prices.

3,000,000 Automobiles in 1917.

The report of the Secretary stated the authorities agreed that the automobile and other internal combustion engines are primarily responsible for the increased consumption of gasoline. Figures were given to show that the number of automobiles in operation January 1, 1899, were 10,000; that the number in 1916 were 2,225,000, and it was estimated that in 1917 the number would be 3,000,000.

Summing up the situation, the Secretary's report said that the consumption of gasoline was rapidly increasing; that the production of crude oil has been generally regarded as near its maximum. It suggested that some immediate relief might be afforded by means of the following:—

First, the use in internal combustion engines of heavier distillates approaching kerosene.

Second, an acceptable kerosene carburetor would go a long way toward relieving the present shortage of gasoline.

Third, general use of cracking processes whereby gasoline is made from kerosene and other less valuable petroleum oils. It was stated in the report that it is practical to produce gasoline from kerosene, gas oil, fuel oil, residuums, and heavy crudes by present-day cracking processes, and that no oil should be used for fuel which has not been so treated. It was pointed out that by increasing the production of crude oil and furnishing necessary supplies of gasoline the shortage might be met, but this was not recommended. Looking to the future the report asserted that benzol might be considered as a substitute for gasoline and oil shale, of which there is a vast quantity in this country, as a substitute source of gasoline. Benzol, a hydrocarbon not greatly different from gasoline, is recovered as a by-product in the manufacture of coke. At present benzol is not likely to find favor with automobile owners in the United States as a substitute for gasoline, the report said, although it is in general use in

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Europe. The objections made to it as a motor fuel are that it requires adjustment of the motor and that the quantities of it available will be so limited as to preclude widespread distribution, ready at every cross roads corner, which the gasoline user has come to expect. The quantity of benzol produced in by-product coke ovens in the United States in 1915 was approximately 14,000,000 gallons, and it was estimated that the output in 1916 would be at least 22,000,000 gallons or 500,000 barrels. This quantity will be consumed in the manufacture of explosives, dyes and chemicals, a type of demand, however, that is expected to be much smaller following the termination of the European war. Under normal conditions the price of benzol has been 20 cents or less a gallon. The report pointed out that the quantity of coal now made into coke is 60,000,000 to 70,000,000 tons annually and that the yield of benzol is two gallons per ton of coal. The universal use of by-product ovens, therefore, would increase the present production of benzol to over 3,000,000 barrels annually.

Navy Requirements of Fuel Oil.

Requirements of the navy in the matter of fuel oil have been tremendously increased during the last year. In the first place, Congress has provided a building program calculated to almost double the size of the navy in the next three years. All of the new vessels are to be oil burners, both because it is easier to handle this fuel and because of the fact greater speed can be obtained by its use, and speed is essential in modern naval warfare.

In his annual report Secretary Daniels of the Navy discussed oil conservation as a national necessity. He said that when the three years' program authorized by Congress is completed the navy will require 6,721,000 barrels of fuel oil supply annually during peace and about three times that amount in the event of war.

Possible Sources of Navy Supply.

It is estimated by the Fuel Oil Board of the navy that in 1927 consumption of fuel oil by the navy will reach over 10,000,000 barrels, perhaps even as high as 12,000,000. The board has suggested the possible sources of oil supply for the navy as follows:—

Petroleum deposits on public lands withdrawn from entry, including the present naval oil reserves; the western half of the Osage national lands in Oklahoma; oil shale deposits in the United States and the oil fields of Mexico, possible petroleum deposits that have not yet been discovered in lands beyond the limits of the United States including Alaska and the Philippines; the oil fields bordering the Carribean Sea.

The naval oil reserves Nos. 1 and 2 are located in California, No. 3 is located in Wyoming. Oil reserve No. 2 is in a proven field and probably contains about 400,000,000 barrels of oil. In the western half of the Osage nation it has been estimated by the Geological Survey there is a possible production of oil amounting to 350,000,000 barrels. While this land belongs to the Osage Indians, the navy officials contend that legislation should be enacted authorizing the government to take over this oil with due recompense for the Indians. However, up to the close of the year no such legislation had been formally recommended to Congress. Should the government decide to take over these oil fields for the use of the navy, it is likely that the question of a government pipeline from the mid-continent field to the Gulf of Mexico, suggested some time ago by Secretary aniels, of the navy, will again come to the fore.

Oil Shale Deposits.

The Geological Survey has estimated that there exists on public demain extensive deposits of oil shale from which a high grade of fuel oil may be extracted by a comparatively simple process. From some of these shales there may be obtained by-products of sufficient value to defray the cost of extracting the oil. Sulphate of ammonia, the principal by-product, is important as a fertilizer and has military value in being a possible source of nitrates. The Geological Survey has stated that there are at least 1,400 square miles of such deposits and that they contain at least 20,000,000,000 barrels of oil, which is nearly three times as much as remains in the oil pools of the United States. Acting on this information, the Secretary of the Interior has already recommended the withdrawal of many thousands of acres of oil shale lands from entry in Utah and Colorado.

Both in Alaska and the Philippines oil seepages which indicate the possibility of petroleum deposits have been found.

Mexican Oil Fields.

On the east coast of Mexico, in the vicinity of Tampico, lies the great oil field of the world. These lands are located within a few miles of tidewater and will probably be the source of the commercial supply of fuel oil for the United States in the distant future. It seems probable that there will be extensive development of oil fields bordering on the Caribbean Sea when the commercial trend renders the working of these fields profitable. There is oil shale in Venezuela, and it is probable that there will be extensive development in Hayti and some development in Bolivia, Barbadoes, Trinidad, Costa Rica, Panama and Colombia. These, and the Mexican fields, will be available in time of peace for importation of oil in large quantities. The Secretary of the Navy, however, is insistent upon the conservation of oil fields within continental United States as a necessity in time of war.

The tremendous amount of oil required by the new navy battle cruisers is almost beyond belief. The battle cruisers are to develop 180 horsepower, and it is estimated that in time of peace each of these vessels will require 150,000 barrels of oil a year. For the new battleships it is estimated that each will probably use 90,000 barrels of oil a year.

Shoshone Leasing Law.

On August 21, 1916, Congress passed a law providing for the leasing of oil properties in the so-called Shoshone ceded lands in Wyoming. The property leased under this act was ceded to the United States Government. The leasing act gives the Secretary of the Interior the authority to lease the property under such rules and regulations as he sees fit. There are about 5,000 or 6,000 acres of approved oil lands, with several properties on which prospective wells have been sunk, involved in the leases. The general geography of the soil structure has convinced experts that there is undoubtdly good oil-bearing land. Surrounding this is an area of more than 25,000 acres that is withdrawn from public entry as possibly containing oil and gas deposits in paying quantities. Across the Shoshone River from this oil tract are lands which are still included in the reservation which are now being leased by the Indian Office, and the Indians get the returns from this. As a general proposition the specifications for leases adopted by the Secretary of the Interior on the land covered by this act of Congress provide for leasing on a royalty basis, and the royalties from these leases will go to the benefit of the Indians. The act provides that the royalties shall not be less than 10 per cent. The leases are to run for twenty years, with right of renewal for succeeding ten-year periods.

The "Tank-Car" Case.

The Supreme Court of the United States handed down an opinion in the so-called oil tank-car case in December. This was the case of the United States and Interstate Commerce Commission vs. the Pennsylvania Railroad Company. The court held that the Interstate Commerce Commission has no power to order railroads to furnish special types of cars to corporations using their lines. The opinion was handed down by Mr. Justice McKenna. The Interstate Commerce Commission had ordered the Pennsylvania Railroad to abstain from refusing to provide tank cars to the Crew-Levick Company for interstate shipments of petroleum products. The commission held that the refusal of the Pennsylvania Railroad to furnish cars was in violation of the Interstate Commerce act and the railroads were required to provide special tank cars at the complainant's refineries to transport normal shipments in interstate commerce. A preliminary injunction against the enforcement of this order of the Interstate Commerce Commission was obtained by the Pennsylvania Railroad in November, 1915, and an appeal was taken to the Supreme Court by the Interstate Commerce Commission and the Crew-Levick Company.

At the close of the year it was confidently reported that further oil land territory, owned by the Indians, was to be opened up by authorization of the Department of the Interior. Recommendations to this effect have been made to the Indian Office, and Secretary Lane gave the matter his personal attention for several months. The opening up of this oil land, it was suggested, might cause a reduction in the high price of oil and foster competition.

Pipe Lines Through Indian Lands.

The first step to aid in rapid construction of oil and gas pipelines across the Indian lands was taken in the Indian appropriation bill passed by the House in December. That measure carried an amendment to the act of March 11, 1904, authorizing the Secretary of the Interior to grant rights of way across Indian lands for the conveyance of oil and gas. Under the amendment, while authority must be obtained from the Secretary of the Interior for the construction of such pipelines, it is no longer necessary that maps of definite location shall have been approved by the Secretary. The necessity for this amendment grows out of the fact that when leases are given on these lands and flowing wells are developed, if the well is a gusher, there is no time to have blueprints prepared and sent to Washington for the approval of the Secretary of the Interior prior to the construction of a pipeline. The amendment will permit applications to be made by wire and pipelines to be constructed hurriedly.

National Gas Safety Code.

The United States Bureau of Standards during the course of the year continued actively its work in the preparation of the proposed national gas safety code, which is intended to cover all phases of the production, distribution and utilization of gases, with a view to the elimination of dangers to life or health or of fire hazards. This code has been sub-divided into ten parts, one of which covers natural gas wells and field stations, and another blast furnaces producers and gasoline gas. Both the Bureau of Standards and the Bureau of Mines gave their attention to the question of standards of gasoline.

Gasoline Purchase Specifications.

The Bureau of Mines in response to a request of the general supply committee of the departments and the Federal Government in the District of Columbia for specifications to govern the purchase of gasoline prepared tentative specifications and sent copies of them to refiners, automobile engineers and other men in the industry with a request that criticism be made of the draft. Director Van H. Manning of the Bureau of Mines expressed the hope that as a result of the consensus of opinion of all interested parties, specifications might be prepared that would be of value not only to the Federal Government in the District of Columbia, but to the entire public using gasoline for fuel. In preparing the specifications the Bureau of Mines stated six requirements for gasoline as follows:—

First, neither the gasoline nor its products of combustion should have a strong or disagreeable odor; second, the gasoline should be free from matter which is not hydrocarbon; third, gasoline should be free from bodies which either originally or after combustion attack the metal composing the engine; fourth, the gasoline should not contain excessive percentage of unsaturated or aromatic hydrocarbons; fifth, the gasoline should not contain too high a percentage of very volatile products; sixth, the gasoline should not contain any considerable percentage of heavy or non-volatile constituents which prevent the atomization into engine cylinders of a mixture which can be completely burned.

The Bureau of Standards issued a warning against haste in the adoption of any standard for gasoline. It pointed out that the establishment of a standard was a complicated matter. In the early days of the petroleum industry, the bureau said, when all our gasoline, kerosenes, fuel oils, lubricating oils, were derived from one source, Pennsylvania crude petroleum, a simple measurement of the specific gravity by means of hydrometer served to the fairly reliable indication of the qualities of these products. Today, however, the specific gravity test is practically worthless as a check on the suitability of gasoline, owing to the fact that so many new oil fields have been opened up which yield petroleums of very different physical and chemical purposes and also to the fact that new methods of manufacture have been introduced that yield products having very different purposes and in no way related to the specific gravities.

The bureau sent to several hundred persons and corporations in the United States interested in the manufacture and use of gasoline a list of questions relating to the standardization of gasoline, to aid in the establishment of a standard. The Bureau of Standards also issued invitations to a number of interested persons and corporations to appear at a hearing on the question of standardization of gasoline in the last part of January, 1917.

Liquid Measuring Pump Investigation.

The Bureau of Standards made an investigation of the liquid measuring pumps used in the sale of gasoline in quantity at distributing stations for motor supplies. Its inspectors examined such pumps in a number of different States and cities. It was found that in the case of numerous measuring stations tested by the bureau inspectors 70 to 80 per cent. had excessive errors. Many outfits were found to be so constructed as to be absolutely unsuited for retail liquid dispensing. In tests conducted in Illinois the government inspectors found that 82 per cent. of the Chicago gasoline pumps and 83 per cent. of those outside of Chicago were inaccurate with a shortage of almost 4 cubic inches a gallon in Chicago and of 7 cubic inches through the State. It was estimated that this shortage meant a loss to purchasers of more than 5,000,000 gallons yearly or about $1,000,000 at the 20-cent rate for gasoline.

It was pointed out by the Bureau that undoubtedly the purchasers of gasoline in States other than Illinois were being fleeced of millions of dollars by the use of pumps which deal short measures. It was also pointed out that it was impossible for the Bureau of Standards to conduct annual investigations of pumps throughout the country and it was recommended that the State authorities give the matter their careful consideration. The bureau has sent to the various State officials recommendations which should be given attention in conducting tests of gasoline measuring pumps.

A report made by the petroleum technologist of the Bureau of Mines on the use of mud-laden fluid in oil and gas wells declared that one of the most shameful wastes of this country's natural resources has been that of natural gas in the oil fields. This waste it was asserted, has been occasioned very largely by not having efficient and cheap methods of controlling the gas nor adequate laws and regulations to enforce the control. Recommendations were made in the report looking to the conservation both of gas and oil in its production.

More Natural Gas Used Than Ever Before.

A report by the United States Geological Survey made in October showed that more natural gas was used in the United States in 1915 than in any other year. The quantity used was 628,578,842,000 cubic feet, which exceeds by nearly 37,000,000,000 cubic feet, or 6 per cent., the record in 1914. The average price of this gas at the point of consumption was 16.12 cents a thousand cubic feet, and its total market value was $101,312,381, a gain of 0.22 cent in unit price.

Credit for the increased production of natural gas belongs to Ohio, Oklahoma, West Virginia, Pennsylvania, Kansas and California, which together produced nearly 40,000,000,000 cubic feet more in 1915 than in 1914. Significant increases were reported also in Arkansas, Wyoming and Missouri. Of the total production of natural gas in 1915 it was estimated that 217,202,943,000 cubic feet were distributed to 2,195,081 domestic consumers at an average price of 28.32 cents a thousand cubic feet, and that the remaining quantity was distributed to 18,350 industrial consumers at an average price of 9.7 cents a thousand. Compared with the corresponding statistics for 1914, these figures indicated with regard to the gas supply of domestic consumers, gains of 7 per cent. in quantity, 6 per cent. in the number of consumers and 0.28 cent in average prices; in regard to the industrial consumers, gains of 6 per cent. in quantity, 3 per cent. in number of consumers and 0.12 cent in average prices.

A bill to place natural gas pipelines under the Interstate Commerce Commission was favorably reported to the Senate by the Senate Judiciary Commitee in August. It is the same bill that was passed by the Senate during the last Congress, but failed of action in the House. It was introduced by Senator Reed, of Missouri. The bill was still on the Senate calendar at the close of the year. There seems little likelihood that it will become a law before the close of the present Congress, for there is much opposition to it in the House Interstate and Foreign Commerce Committee, which must handle the bill if it passes the Senate.

Mineral Oil Exports.

The report of the Department of Commerce in August showed that in the case of mineral oil exports for the twelve months ending June, 1916, the total number of gallons were 2,413,563,904, as compared with 2,177,414,335 the previous year.

In July the Interior Department announced that Secretary Lane had approved oil leases disposed of at an auction sale embracing land belonging to the Osage Indian tribe, thereby concluding the transaction in connection with new oil and gas leases covering 680,000 acres of land that were included in the former so-called Foster lease, which expired in March, 1916. It was estimated that the annual income of the Osage tribe under new oil and gas leases would aggregate at least $2,500,000—this in addition to the $3,233,000 received in cash at recent sales. The Indians received heretofore about $500,000 annually under the old lease. The new leases are for a period of five years, but may run until the year 1931, provided oil and gas continue to be found in paying quantities. The 680,000 acres of land involved was held under the Foster lease by 160 subleases in areas ranging from forty to 300,000 acres, and under this lease the tribe received one-eighth royalty of the oil produced. New oil leases were granted to sub-lessees covering their former holding not exceeding 4,800 acres each, and aggregating about 190,000 acres. Under the new leases the Osage Indians received one-sixth royalty from wells producing less than 100 barrels a day and one-fifth producing 100 or more barrels daily, and also a rental of $1 per acre per year on each 160 acres of undeveloped land.

Former gas leases covering the same land embraced 680,000 acres in the gas leases, covering about 9,000 acres. Under the new gas leases a minimum royalty of 3 cents per thousand cubic feet is to be paid.

Publication of Petroleum Data.

The House Committee on Mines and Mining in July ordered a favorable report on the bill introduced by Representative Carter, of Oklahoma, authorizing the Secretary of the Interior to collect and publish monthly statistics and data relating to the production, manufacture and marketing of crude petroleum and all its products. The bill carried $20,000 for this purpose for the fiscal year ending June 30, 1917. The bill was still on the House calen-

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dar at the close of the year. This was one of the many measures introduced in the House providing for investigation of one kind or another into the petroleum and gasoline industries. Representatives Steenerson of Minnesota, Dowell of Iowa and Sabbath of Illinois and others stood sponsor for these measures, none of which became laws.

Congress, however, placed in the naval appropriation bill for the present fiscal year an item of $60,000 for an investigation to be made, under the direction of the Secretary of the Navy, for fuel oil and gasoline adapted to naval requirements, including the questions of supplies and storage and for the purpose of necessary instruments and appliances at the Navy Yard in Philadelphia. An amendment, offered by Senator Walsh, of Montana, for the extension of the investigation to the question of availability, economical and otherwise, of the naval oil reserves and public lands as sources for obtaining oil for the navy was agreed to.

The Supreme Court of the United States handed down an opinion in the case of the Indian Territory Illuminating Oil Company vs. the State of Oklahoma in which it held that the State could not tax oil leases made by the Osage Indians under the acts of 1891 and 1905.

A report by the Geological Survey on the Caddo oil fields showed that, including the production of 1914, this oil field has yielded more than 38,000,000 barrels of oil and a very large unknown amount of gas, beginning with the 1906 production, which was only 3,358 barrels of oil. Some sections of this oil field were in litigation during the year over the question whether part of these oil lands are government lands which have not passed to the State of Louisiana, but are claimed by private indivduals who are contesting the right of the State of Louisiana to issue the present leases for extracting oil in the Caddo fields. An attempt was made to place some provisions in the general leasing bill to give relief to these Louisiana claimants. In its report on the Caddo field the Geological Survey said that oil and gas are found in three different formations and that oil has been found sporadically in the fourth.

Oil Bills in Congress.

Representative Bailey, of Pennsylvania, last April introduced a bill to authorize the Secretary of the Interior to develop oil-producing lands that are part of the public domain. The object of the bill was to enable the government to force down prices of petroleum and gasoline. It is proposed to appropriate $10,000,000 to enable the government to develop these oil lands. Another bill, introduced about the same time in the House, was by Representative Steenerson, of Minnesota, to confer upon the Federal Trade Commission the power to regulate prices of gasoline and petroleum. Representative Howard, of Georgia, introduced a bill to place an embargo on all petroleum products on the ground that in this way it would be possible to prevent the exportation of gasoline and keep the prices down. Representative Britton, of Illinois, offered a bill in which he proposed as a solution of the problem connected with the increased price of gasoline that there be imposed an export tax on all gasoline sent out of the country. His bill, however, was of very doubtful constitutionality, owing to the provision of the Federal Constitution prohibiting the imposition of a tax upon exports out of any State of the Union. When his attention was called to these he then offered a resolution to amend the Constitution so as to enable Congress to levy an export tax.

"Cracking" Process and Gasoline Substitutes.

During the year the Rev. Mr. McKnight, of Pittsburgh, came forward with a claim that he had invented a substitute for gasoline. He sought to make a demonstration of the discovery, and also to present his invention to the government. A patent for the Rittman process for the manufacture of gasoline, etc., from crude petroleum was accepted by the Senate and House. The resolution authorizing the Secretary of the Interior to accept, as trustee for the people, the assignment of the Rittman patents was adopted without opposition. In his annual report Director Manning of the Bureau of Mines asserted that the Rittman process is now commercially a success and that licenses for the use of the Rittman process had been granted to twenty-two oil companies operating refineries throughout the various oil fields of the United States. In the report it was said that the bureau's San Francisco station had been equipped with an experimental Rittman furnace and that various grades of California oil and distillates had been tested and the results furnished to the licensees of the process. This work indicated that the Rittman process can manufacture gasoline for as low a cost as 6 cents per gallon from stove distillates costing 2 cents per gallon.

An investigation was made of a new absorption method of extracting gasoline from natural gas. By this method natural gas is brought in contact with the petroleum distillates of about 35 degrees Baume gravity, where the oil absorbs the gasoline from the natural gas. If this process is generally applied it is estimated that about 100,000,000 gallons of gasoline can be recovered from natural gas each year.

IMPORTANT CHANGES AND RULINGS UNDER NARCOTIC AND FOOD AND DRUG LAWS

Supreme Court Decision on Possession Clause of Harrison Anti-Narcotic Law Great Setback—Activity of Bureau of Chemistry.

DRUG manufacturers were given a certain amount of protection, so far as medicinals derived from coal-tar products are concerned, under the revenue law enacted by Congress during the last year. The medicinals, flavors and synthetic resin will bear a duty of 30 per cent. ad valorem. They are cared for in the dye schedule. In the Senate an attempt was made to add a specific duty of 5 cents per pound in addition to the ad valorem duty, but this failed owing to the opposition in the House.

In the wine schedule of this law the medicinal compounds are exempt from taxation. So far the provisions of the new law relating to "alcohol," meaning distilled spirits, grape brandy or wine spirits used in the fortification of sweet wine, fermented liquors, wines, liqueurs, cordials, etc., are concerned there was no change in the tax on distilled spirits; in the case of grape brandy or wine spirits used in the fortification of sweet wines the tax was reduced from 55 cents a gallon to 10 cents; fermented liquors remain the same at $1.50 per barrel containing not more than thirty-one gallons. In the case of wines and liquors schedules, however, the taxes were somewhat changed.

Blow to the Harrison Law.

The United States Supreme Court in a decision handed down in June delivered a serious blow at the Harrison Anti-Narcotic law. By its decision the court nullified the position taken by the supporters of the law that the possession of inhibited drugs by persons not legally authorized to have such drugs is a crime, and thus left the way clear for the indiscriminate placing of these drugs in the hands of persons addicted to their use, so long as the law is obeyed in the methods employed in so placing the drugs, whether by prescription or otherwise. The opinion of the court was written by Mr. Justice Holmes, with the indorsement of Chief Justice White and Justices McKenna, Vandevanter and McReynolds. Associate Justices Hughes and Pitney dissented. There was one vacancy on the bench and one justice was absent on account of illness.

The decision of the court was sweeping and far-reaching in regard to the control of the distribution and sale of narcotic drugs. It had the effect of rendering virtually useless the machinery built up for the control of sales. Under the Harrison Anti-Narcotic law the possession of opium, morphine and similar narcotic drugs had been held a crime, since section 8 of that law makes it unlawful for any person not registered and who has not paid a specified tax to have in his possession any of the enumerated drugs. By the decision of the Supreme Court the mere possession of narcotic drugs by a person, even though he may be a drug habitue and the prescription may not have been given in good faith, is not held in itself criminal, and neither is the prescribing physician guilty of conspiracy under the law, as has been the usual finding in Harrison law prosecutions. In the opinion of the court, "any person not registered" in the ——— of the law cannot be taken to mean any persons whatsoever in the United States, but must be taken to refer to the class with which the suit undertakes to deliver—the persons who are required to register by section 1 of the law.

Following the announcement of the decision the attorneys of the Department of Justice and the Treasury Department who have been charged with the duty of enforcing the Harrison law and members of the medical fraternity, including the Public Health Service, held a number of conferences to determine what should be done.

New Legislation Recommended.

In his annual report, submitted in November, the Commissioner of Internal Revenue discussed the need of legislation to amend the Harrison Anti-Narcotic law in order that the law may be properly enforced. The following amendment to the law was recommended:—

"First, a tax on the drugs, with provisions for original stamped packages evidence of non-payment of the tax and violation of the law, except where such packages contain drugs put up upon prescriptions issued for legitimate medical purposes by a registered practitioner, and to make the possession of an original stamped package by any person not registered prima facie evidence of non-payment of special tax and violation of the law.

"Second, That the limitations as to registration under the act be clearly set forth and restricted to persons lawfully engaged in the sale of or dispensing, administering, or prescribing the drugs covered by the act, and that the writing of prescriptions, keeping records, altering or forging the same be fully covered with adequate provision for punishment of such offsenses.

Third, making all the general provisions of the internal revenue statutes relating to seizures, forfeiture, etc., applicable to the drugs taxed and the persons upon whom special taxes are imposed under this act."

The Commissioner of Internal Revenue recommended that Congress appropriate sufficient money to pay back the fines imposed by the courts upon persons convicted of unlawful possession, which were rendered null and void by the decision of the Supreme Court. The commissiner further recommended that Congress provide for the treatment by the government, through some designated medical agency, of the persons addicted to the use of any of the prescribed drugs, where such treatment may be rendered necessary and the persons affected desire this aid.

Operation of Harrison Law.

Reviewing the operation of the Harrison Anti-Narcotic law, the commissioner stated that at the close of the fiscal year ending June 30, 1916, the law had been in effect sixteen months—a sufficient time to give the administrative officers a clear view of the conditions which the act was intended to remedy and at the same time to show several serious defects of the law and the need of amendatory legislation. He pointed out that during the twelve months ending June 30, 1916, there was reported a total of 23,754 violations of this act, which included those of technical nature, and also violations of the provisions of the regulations issued under authority of the law. As a result of these violations prosecutions in the more flagrant cases were instituted and resulted in the conviction of eighty-three registered persons and 580 unregistered persons, or a total of 663. Collections from fines imposed by the courts in 138 cases amounted to $19,676.84, while there was collected from compromises during the fiscal year 1916 $36,492.29. The report also shows that 242,926 persons were registered under the provisions of the Harrison Anti-Narcotic law. Of this number 132,955 were physicians, 14,322 were dentists, 11,683 were veterinarians, 3,381 were hospitals, 50,604 were retail dealers, 709 were wholesalers, 1,354 were manufacturers, 214 were importers, 147 were educational institutions and 657 were miscellaneous.

Pure Food and Drug Law Activities.

The Bureau of Chemistry was active during the year in the enforcement of the Pure Food and Drugs law. During the last year the officials analyzed 29,933 samples of the foods and drugs offered for interstate shipment and for import. Physical examination was made of samples from 76,468 shipments offered for import. Of the foreign shipments 6,353 were found to violate the law in some respect and were either excluded from the country or admitted only after the importers had relabeled them to comply with the law. Of the samples of domestic products analyzed 3,535 reported against, either because of the nature of the product or because the label on it did not tell the truth or found to be in violation of the law.

The Department of Agriculture, in 1,364 cases, recommended to the Department of Justice that criminal prosecutions be instituted against the manufacture or that the goods be seized. In other cases where there was no evidence of intention to defraud, and where there was merely some easily remedied flaw in the wording of the label, the shippers, after being warned in the hearings, voluntarily took steps which made their products fully comply with the requirements. A total of 8,715 such hearings were held. Also evidence was gathered for a large number of additional cases which will be handled by the Department of Justice in the new year.

The chief of the Bureau of Chemistry called attention to the fact that, through the system of serving and regulatory announcements now in use, manufacturers are given due notice of the requirements and thus are enabled voluntarily to make their products conform to the law.

Counterfeiting and Adulteration.

Special emphasis has been given to the control of drug products and foods liable to spoilage and pollution. During the year attempts to counterfeit or adulterate imported drugs were more common, owing to the price and scarcity of many of these products. Out of 1,036 cases terminated in the courts during the year, 198 were brought on account of false and fraudulent labeling of medicines. With the exception of five cases, the courts found with the Government. The work of controlling fraudulent labels of medicines and mineral waters was greatly strengthened by the establishment of a separate office to deal with these matters. At the request of the Secretary of Agriculture an officer of the United States Health Service was detailed to take charge of this work. Through the close co-operation established with food and drug officials of many of the States, the department was able to direct attention of the local authorities to the presence of spurious drugs in their States. As a result much of these fraudulent goods in the hands of local dealers and beyond the reach of the Federal authorities were destroyed by State and municipal officers, who in many cases prosecuted those responsible for the local traffic.

Just at the close of the year, Dr. Henry H. Rusby, dean of the College of Pharmacy of Columbia University, resigned from the position of pharmacognosist at the port of New York, and as attache of the Bureau of Chemistry. Dr. Rusby's resignation was brought about, according to reports, because he felt dissatisfied with the limited time and provision made for his inspection of drugs entering the port of New York. Also it has been claimed that owing to the restrictions put upon him, small part of the drugs entering New York have been inspected and that impure drugs entered the country and into consumption. Dr. Rusby's inspection of drugs, it was asserted, was limited to 210 hours a year and his pay to about $1.40 per hour. If he did more than 210 hours' work he received no pay for it from the Government. Dr. Rusby, it was said, was unwilling to stand sponsor for the character of the drug importations and the conditions of service that did not admit of his seeing them. During the previous year Dr. Rusby was allowed 420 hours, and although that was a very inactive year in drug importations, owing to the war conditions, he still found his time well occupied by the work. Dr. Rusby was for about ten years connected with the department, serving the greater part of the time under Dr. Harvey W. Wiley, former chief of the Bureau of Chemistry. Dr. Wiley, following the announcement of the resignation of Dr. Rusby, gave out a statement in which he entirely supported the claim that the limit put upon the work and time that Dr. Rusby was unfortunate and that it necessarily led to the importation of spurious and impure drugs.

Mailing of Medicinal Poisons.

Postmaster General Burleson, in an effort to make it possible to have medicinal poisons shipped through the mails under proper regulations to safeguard the public, in his annual report urged an amendment of the existing law. Appreciating the justice of the recommendation by the Postmaster General, the House Committee on Postoffices, in drafting the postoffice appropriation bill, inserted a paragraph which would give the Postmaster-General the power to make such regulations which would permit the shipments of medicinal poisons through the mails now prohibited.

This amendment would limit the use of the mails with respect to medicinal poisons to registered manufacturers or dealers on the one hand and to registered physicians, pharmacists, dentists or veterinarians on the other. The purpose of the department in suggesting this amendment was not to put these poisons in the hands of the public, but to use the mails to deliver them in the hands of authorities made responsible under local regulations, State laws or some such enactments for their proper use and to whom improper use could be traced. Of course, it was understood at the time the bill was reported to the House from the Postoffice Committee that this provision was new legislation attached to a general appropriation bill and therefore subject to a point of order. Such a point of order was made against the amendment when the bill was up in the House for consideration by Representative Randall, of California, and the provision was stricken out. It may yet be replaced in the bill, however, in the Senate.

Many drug interests have opposed granting the Postmaster General authority to prescribe rules and regulations under which medicinal poisons may be admitted to the mails and have insisted that such regulations would be optional with the Postmaster General and might not be properly exercised, if exercised at all. These drug interests desire that authority to deliver these poisons through the mails be given directly through the law itself.

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They have supported the Kern-Doremus bill, introduced at the request of the National Association of Manufacturers of Medicinal Products, which they contend covers this point exactly. Other drug interests favored the so-called Griffin bill, introduced at the instance of the Drug Trade Section, New York Board of Trade and Transportation.

Officials of the Postoffice Department insist that unless the drug interests get behind the proposition of the department in this matter there is no chance of their obtaining legislation at all under the present administration. The contention of the department is that physicians, druggists and chemists should support the department's proposition on the ground that there should not be a handicap to the people in the matter of obtaining medicinal drugs in the proper way. They contend that the department is merely trying to safeguard the public from having these drugs placed in improper hands. There is a great demand for the use of the mails to transport these articles.

New Form of Guarantee Label.

At the close of the year a new form of guarantee on food and drug packages went into effect. The old legend read as follows:

"Guaranteed by manufacturers under the food and drugs act June 30, 1906, serial number 265, 424."

The Department of Agriculture did not prescribe the exact form that the guarantee should take, but expressed the opinion that the following wording would be satisfactory:

"I (we), the undersigned, do hereby guarantee that the articles of food (and drugs) listed herein are not adulterated or misbranded within the meaning of the federal food and drugs act, June 30, 1906, as amended."

This new guarantee is not to be attached to the labels on packages of foods or drugs which enter interstate and foreign commerce, but the guarantee may go on the invoice or bill of sale. According to a food inspection decision which became effective November 1, 1916, the manufacturers may not make any statement regarding a guarantee or serial number on the labels on packages. However, under the order, labels containing the guarantee legend or serial number which were printed prior to May 5, 1914, the date on which the first notice to discontinue the guarantee legend on the serial number was issued, may be used until May 1, 1918, in order to prevent the loss that otherwise would occur from the destruction of such labels.

Why Change Was Made.

The change in the form of guarantee on food and drug packages was due to the fact that consumers and some retail dealers incorrectly assumed that the guarantee legend meant that the sample of the product had been examined by the United States Department of Agriculture and that in effect the United States Department of Agriculture actually guaranteed the product. As a matter of fact, the manufacturer or wholesaler who desired the guarantee that his products comply with the food and drugs act were permitted to file a general guarantee with the Department of Agriculture to the effect that the foods or drugs to be shipped into interstate commerce were not adulterated or misbranded within the meaning of that act. Upon the receipt of the proper executive guarantee the manufacturer or wholesaler was authorized to use this number on his labels to indicate that the guarantee which he had filed with the department covered the products on which the number was used. The object of the guarantee is to make the manufacturer or wholesaler or person who knows the composition of the food and drug products responsible for their compliance with the provisions of the law. The guarantee was never intended to be, and never has been, in any sense, a guarantee by the Department of Agriculture.

Standards for Foods and Drugs.

Secretary Houston of the Department of Agriculture in his annual report made public in December strongly urged the adoption of standards for foods and drugs. Such standards, he said, were essential in the enforcement of the purposes of the Pure Food and Drugs Act. He pointed out that in some cases maintenance of prosecution is difficult and expensive, even when the articles involved clearly are adulterated or misbranded. To meet the situation, he recommended that the Secretary of Agriculture be authorized to establish standards of strength, quality, or purity of articles of food, and for those articles of food or drugs which are sold under or by a name not recognized in the United States Pharmacopoeia or National Formulary. His suggestion provided that if any article failed to conform to the established standards, it should be deemed to be misbranded unless it was labeled so as to show plainly how it differed from the standard. The contention of the Secretary was that such a plan would benefit both the consumer and the honest manufacturer.

The Secretary of Agriculture also recommended that the department be given authority to inspect establishments producing foods and drugs intended for shipment in interstate or foreign commerce. No such specific authority exists at the present time. He pointed out that many forms of adulteration were very difficult to detect with the inspection of the places of manufacture, this being particularly true of foods produced from unsanitary conditions. In many instances he held it was impossible to determine from a chemical or bacteriological examination the conditions under which a particular food or drug was produced.

New Regulation as to Narcotics.

Under rule by the Commissioner of Internal Revenue, issued last May, an annual inventory of narcotic drugs on hand must be submitted at the time of application for registration by all persons applying for registration under the Harrison anti-narcotic law. The Commissioner of Internal Revenue also issued a number of new and important changes in the regulations dealing with the narcotic law. They related to the sale and disposal of drugs and to regulations for prosecutions in the violation of the law.

Representative Smith of Idaho introduced a resolution last July directing the Public Health Service to conduct investigations with reference to th injurious effects of alcoholic liquors, opium and other narcotic products throughout the United States. The resolution was referred to the House Committee on Interstate and Foreign Commerce. The introduction of this resolution was prompted by life insurance interests which alleged that the American people past forty years of age are dying more rapidly in proportion to-day than in the closing quarter of the nineteenth century.

For the first time in its history the Army Medical School at Washington made during the last year a large quantity of phara-typhoid vaccine, in order to supply the troops going to the Mexican border. The school can easily produce thirty gallons of vaccine a week, enough, it is said, to treat 50,000 men with three injections. Phara-typhoid closely resembles typhoid, but is a mild form. It has never been prevalent in the United States, but seems more common along the Mexican border.

The United States Health Service discovered during the year that it could get along without some of the drugs and chemicals that prior to the European war were regarded as indispensable, for instance, phenol, used for disinfectant, has been practically abandoned, and pine oil has been substituted and is regarded as much more effective.

Viruses Serums and Antitoxins.

The Department of Agriculture, in the enforcement of the virus act of March 4, 1913, against the preparation, shipment and importation of viruses, serums, toxins and analagous products, intended for use in the treatment of domestic animals, reported thirty-eight apparent violations to the Attorney-General. Fines aggregating $185 were imposed in thirty-six cases.

In this connection it is of interest to note that a bill was introduced in the House by Representative Steele, of Iowa, designed to give the Secretary of Agriculture authority to regulate the preparation of viruses, serums, toxins and kindred products for use in connection with domestic animals. The bill later was favorably reported from the House Committee on Agriculture and finally passed the House. It is yet to be acted upon by the Senate and is now before the Senate Agricultural Committee. The bill provides for the issuance of licenses by the Secretary of Agriculture for establishments where such viruses, serums, etc., are produced and prohibits the transportation or sale in interstate commerce of any worthless or contaminated products of this nature.

The House passed in December a bill for the regulation of the importation of viruses, serums, toxins and analagous products for the prevention or cure of the diseases of man. The bill was passed on the recommendation of the Secretary of Agriculture and the Secretary of the Treasury. Its objects are to remedy the defects of the existing law for the control of the interstate and international traffic in virus products intended for the prevention and cure of diseases.

The Supreme Court of the United States, in an opinion handed down by former Associate Justice Hughes, remanded the so-called coca-cola case to the lower court for further action. The case decided was entitled the United States vs. forty barrels and twenty kegs of coca-cola, the Coca-Cola Company, of Atlanta, Ga. The court directed that the case be again tried by the lower court, and held that the lower court erred in directing a decision instead of sending the case to the jury. The case alleged misbranding in that the seized shipment was found to contain caffeine. But the Supreme Court did not hear the case on its merits and simply reversed the decision of the lower court and remanded it for further consideration on the ground that the lower court erred in directing a verdict in favor of the company instead of letting the case go to the juy.

Fungicides and Disinfectants.

Senator Wadsworth, of New York, was the author of a bill introduced in the Senate to prevent the manufacture, sale and transportation of adulterated or misbranded paris green, arsenates and other insecticides, also fungicides, and for regulation of the traffic therein. It would extend the principle of the Pure Food and Drugs act to insecticides for external use. It provides that the bactericidal coefficient as determined by the method approved by the Secretary of Agriculture must be plainly stated on the label.

In the enforcement of the insecticides act, which is designed to prevent the shipment in interstate and foreign commerce of misbranded and adulterated insecticides and fungicides, eighty-seven cases were reported to the Attorney-General, according to the Department of Agriculture's summary of activities during the last fiscal year. In seventy-six of these cases criminal proceedings were instituted and in eleven seizures were recommenced. Fines aggregating $2,040 were collected in eighty cases, decided in favor of the government. Decrees of condemnation and forfeiture were entered in ten of the civil cases.

Proprietary Medicines.

A committee representing the American Medical Association last March submitted to President Wilson a request that he interest himself, through Congress, in some plan calculated to create a commission to investigate the proprietary medicinal business. It was stated at the time that there were many evils of national scope connected with the patent medicine business.

In a deficiency law passed by Congress $25,000 was provided for special studies of a demonstration in rural sanitation.

In the legislation, executive and judicial appropriation law passed by Congress for the fiscal year closing June 30, 1917, an item of $300,000 was carried to enable the enforcement of the law respecting the sale of opium, etc.

POTASH FROM KELP AND GOVERNMENT'S $20,000,000 NITRATE FIXATION PLANT

Studies of Sources of Nitrogen Supply—Need of Developing Domestic Supply Emphasized by Conditions Due to European War.

OWING to the continuance of the European war, the supply of materials for fertilizers from European countries, particularly Germany, upon which the United States has relied in the past, continued to be lacking during the last year. The need for such materials spurred on, not only private concerns interested in the production of fertilizers, but also the Federal Government, to develop the sources of supply in this country which would make the United States independent of foreign importations. The Federal government made provision in the Agricultural Appropriation law for the establishment and operation of a government plant to obtain potash from the great beds of kelp which grow along the Pacific Coast. In the law reorganizing the army provision was made for the establishment of a $20,000,000 nitrate plant. This plant was primarily to produce nitrate for use in explosives for the army and navy, but was also designed to produce nitrates for use in fertilizers.

Congress appropriated $175,000 to be used by the Secretary of Agriculture in the establishment of a plant to make potash from kelp, and the Secretary of Agriculture has determined to establish this plant at Summerland, in California, to which vast beds of kelp, growing a short distance from shore, are accessible. J. W. Turrentine, an expert of the Bureau of Soils, is to have charge of the plant as soon as it is constructed. Eight private companies have operated plants for the production of potash from kelp during the last year. But the experts of the Bureau of Soils believe that these private concerns are operated only on the basis of the high prices now charged for potash. They do not believe that these companies are attempting to reduce the cost of operating their plants to a point where they would be able to do business when the European war is over and the importation of potash salts from Germany can be resumed.

The government will attack the problem from a different standpoint, seeking not only to produce potash from kelp at a minimum cost, but seeking also to utilize the by-products, such as nitrogen and iodine, which will result from the process. The government experts are confident that by adopting such methods potash can be obtained from kelp on a commercial basis after the close of the war. They feel that American capital stands ready to go into the development of the potash industry at this time. The government plant will begin operations with 200 tons of wet kelp per day, and this may be increased later to 400 tons a day. The production of potash and by-products from such an amount of kelp will be appreciable and will be sold to the highest bidder. The plant is to be experimental primarily, however, and the Secretary has no idea of competing with private enterprises.

$20,000,000 Nitrate Plant Not Yet Located.

Although the government has made provision for the establishment of a $20,000,000 nitrate plant, the location of the plant has not yet been determined upon, nor has the process by which the nitrogen is to be fixed been selected. The entire matter is in the hands of the President for final determination. In the meantime the Ordnance Bureau of the War Department, the Bureau of Soils of the Department of Agriculture and the Bureau of Mines of the Department of the Interior have been at work endeavoring to ascertain the most economical process by which the government can develop a supply of nitrates for use in the manufacture of explosives and fertilizers.

Principal Sources of Nitrogen Supply.

There are four principal sources of nitrogen supply or methods for its development:—

First—The importation of Chile saltpeter, which, of course, is a foreign supply and subject to interruption.

Second—The recovery of nitrogen from the ammonia liquor of the by-product coke ovens.

Third—The fixation of atmospheric nitrogen by the cyanamid process.

Fourth—The fixation of the atmospheric nitrogen by the arc process.

At present the Chilean nitrate supply is the main reliance of this country. The recovery of nitrates from the by-product coke ovens, if adopted by the government as the source upon which to rely for its nitric acid for the manufacture of munitions and also for the manufacture of fertilizer, would do away with the necessity of expending the tremendous sum of $20,000,000 for the nitrate plant.

The Ostwald Process.

In this connection the Bureau of Soils and the Bureau of Mines, in conjunction with the Semet-Solvay Company, have been investigating the Ostwald process for obtaining nitric acid and by-product ammonia. It has been estimated that 68 per cent of the coal coked at present is coked in the bee-hive ovens, and 32 per cent. in the by-product ovens. More and more by-product ovens are taking the place of bee-hive ovens. The by-products from the coking of coal include gas, tar, ammonia and benzol and several other minor products. It has been shown by investigation that 350,000 tons of ammonia sulphate will produce 300,000 tons of nitric acid, and also that ammonia sulphate is more productive of nitric acid than is the sodium nitrate from Chile. In 1916, it is estimated about 234,000 tons of ammonia sulphate were produced in this country. In view of the ever increasing number of by-product coke ovens it has also been estimated that during 1917 376,000 tons of ammonia sulphate will be produced. Should by-product ovens entirely supplant the bee-hive ovens, some 800,000 tons of ammonia sulphate would be produced in 1917. The importation of sodium nitrate from Chile in 1915 was 577,000 tons, of which about 40 per cent. went into the manufacture of explosives, the rest being used for fertilizer. It appears, therefore, that the amount of Chilean sodium nitrate imported to be used for explosives produces decidedly less nitric acid than could be obtained from the present output of by-product ammonia in this country. It has been pointed out that in the event of war the government could, if it desired to increase the supply of by-product ammonia, replace all bee-hive ovens with by-product ovens.

By-Product Ammonia as Source of Supply.

While no decision has been reached in regard to this matter, government experts are inclined more and more to by-product ammonia as the source of supply for nitrates to be used both

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for explosives and fertilizer. The Ostwald process has been tried out on a small scale at the Bureau of Soils laboratory in Virginia near Washington. In both England and Germany this process for the production of nitric acid is being used to a large extent at present. However, in those countries every means of producing nitric acid for explosives has been adopted, almost regardless of cost, on account of the war emergency. In this country it is necessary to develop a process which is economical and reasonable in time of peace.

It is possible, however, that politics will play a part in the final determination of a nitrate supply. The law providing for the construction of a $20,000,000 nitrate plant was put through at the demand of Senator Underwood of Alabama, who, with other members of Congress from the South, has been strongly in favor of the development of water power at Muscle Shoals, on the Tennessee River in Alabama. There is no doubt that strong efforts will be made to have this power plant for the production of nitric acid located there. This, of course, will only be true if the President finally decides to adopt the process of fixation of atmospheric nitrogen in which electric power developed by water power is required.

The Cuban Potash Fake.

In October reports came from Cuba that a tremendous potash discovery had been made at Montembo, Santa Clara Province. The reports to this effect were widely circulated in certain New York newspapers and a large corporation was immediately organized for the purpose of selling stock and developing the supposed potash field. The matter was of so much moment to the fertilizer interest in the United States that the Reporter immediately took the matter up with the State Department in an effort to ascertain the facts. At the Reporter's request a cablegram was sent to Vice-Consul H. R. Wolcott, in charge of the American consulate at Havana, asking him to confirm the report as to the potash. Mr. Wolcott replied almost immediately that the reports of a large potash find appeared not to be well founded.

Notwithstanding the cablegram to Mr. Wolcott, those interested in promoting the corporation for the development of the alleged potash fields continued to insist upon the truth of the first reports. Again the reporter took the matter up with the State Department, and at its own expense another cable was sent to the Vice-Consul at Havana, asking him to hurry along a final statement in regard to the potash in Cuba. In his final report to the State Department Vice Consul Wolcott said that local representatives of the Bradley Fertilizer Company, the Nitrate Agencies, the German Kali Works and Swift & Co. were of the opinion that the alleged discoveries of potash were of very doubtful foundation. Mr. Wolcott said, however, that he had finally received the report of an engineer sent by the Cuban Government to make a detailed examination of the alleged potash deposits. This report by the Cuban Government engineers read almost like a romance. It showed that potash samples had been deliberately "dosed." The Cuban engineer declared that he considered it a deliberate plot to take advantage of the unwary, and that promoters of the scheme had even gone to the extreme of obtaining the potash used to dose the samples of alleged potash rock from the ashes of trees. The Cuban engineer analyzed samples of the rock which had been "dosed" and found there was practically no potash in it.

Examination of United States Nitrate Deposits.

The Geological Survey announced in November that nitrate deposits in many parts of the United States had been examined during the last two years by it, but that the results of such examinations had been uniformly disappointing. It reported that prospectors in many places have raised great hopes by finding good surface showings, but investigations have seemed to force the exceptance of a general adverse judgment as to their value. According to the Survey's reported findings, specimens of pure nitrate of soda and nitrate of potash have been found in many parts of the country and careful investigation of specimens and locators seem to warrant some definite conclusions as to the practical value of these deposits. It appears that the deposits are superficial; that they do not extend far into the mass of rocks, and the nitrates found are insignificant in amount where the samples obtained are rich in nitrate soils. On the other hand, nitrates are found in unusually large quantities in some soils and clay hills, particularly in Southern California. These deposits have been examined and the general conclusion reached that they could not be utilized, owing to the small percentage of nitrate contents. In conclusion, it is reported, the ecological Survey announced that it would always be glad to make examination of samples submitted to it and to do all in its power to aid in the location of nitrate deposits.

The Bureau of Soils of the Department of Agriculture has done much during the last year along the line of developing a potash supply from the flue dust in cement plants. It has urged the use of electric precipitators to obtain potash from flue dust. Investigations at a number of plants has shown that a large amount of potash might be obtained from the by-product of cement manufacture, making almost a clear gain for the cement manufacturers. The experts of the bureau contend that if all the factories can be prevailed upon to install electric precipitators, a very large percentage of the potash required in this country each year may be obtained. Also the flue dust that now escapes in the air, a real nuisance, may be converted into a useful asset.

The Bureau of Soils made arrangements last fall with one of the large baking powder companies of the country to try out a new method of obtaining phosphoric acid, discovered by a chemist of that bureau. It is expected that through the aid of the baking powder company it will be determined whether phosphoric acid can be obtained on a commercial basis by this new method. The process invented by the Bureau of Chemists consists of smelting phosphoric rock with coke sand in furnaces. These are precipitated by means of a Cottrell electrical precipitator. The claim was made by the Bureau of Soils chemists that they obtained 92 per cent. concentration of the phosphoric acid and that the acid so obtained is 99.89 per cent. pure. The new feature of the bureau's process lies in the use of the Cottrell precipitator. A patent for the new process was applied for and will be donated to the American people by the Department of Agriculture.

Fertilizer Report of Federal Trade Commission.

The Federal Trade Commission presented its report on the fertilizer industry in September. Summarized, the report asserted that wholesale prices of nitrogenous and phosphoric acid materials have been governed fundamentally by conditions of supply and demand during the period covered by the investigation, although artificial conditions have at times exerted a temporary influence. The wholesale prices of German potash salts have been controlled by a syndicate of producers of which the Prussian Government is a member, eliminating competition in prices since 1910. The farmers' prices of fertilizer materials in this country for cash purchases have compared favorably with wholesale prices, but farmers' credit prices have often been excessively high. The commission reported that most of the fertilizers used in this country are purchased in mixed form and not in the form of materials. There are about 800 concerns operating some 1,200 plants in the mixed fertilizer industry. The seven largest companies with their subsidiary and affiliated concerns control more than 50 per cent. of the total output. The two largest concerns sell annually about 34 per cent. of the total output. The commission said the objectionable selling methods of some of the large mixed fertilizer manufacturers were the unnecessary multiplication of brands and the operation of controlled companies as independents. The commission also criticised the expensive distributing methods of the large fertilizer companies which, it contended, have in part caused the high prices of fertilizer to farmers and prevented large profits to the manufacturing companies.

Potash in surprisingly large proportion was found during the year in the brines and muds of the Salduro marsh, a sink in the Salt Lake desert, Utah.

A report by the Geological Survey on the potash produced in the United States during the year 1915 was of interest chiefly by reason of the emphasis which it placed upon the need of developing an adequate domestic supply. The potash produced was valued at $350,000 and represented the quantity consumed in less than a week in this country under normal conditions.

ALCOHOL, CITRUS PRODUCTS, COTTONSEED CENSUS AND OTHER FEDERAL ACTIVITIES

DENATURED alcohol as a possible substitute for gasoline in developing motor power has been given much careful consideration during the last year. The high prices of gasoline and the probability that eventually the supply of gasoline and the crude petroleum from which it is obtained may become so reduced as to make its usé in driving motors prohibitory have been largely responsible for the increased activity along this line. Several bills were introduced in Congress looking to the promotion of the production of domestic industrial alcohol. These measures are intended to encourage the establishment of small and scattered distilleries located on farms where various waste materials which now net the farmer nothing may be used for the production of denatured alcohol.

Alcohol Bills Introduced.

Among these bills were those introduced by Representative Carey of Wisconsin and Representative Casey of Pennsylvania. The Casey bill at the close of the year was still before the House Committee on Agriculture, although the National Grange, during its annual convention in Washington in November, went on record as favoring its enactment. This bill provides for the establishment of an industrial alcohol commission to aid in developing the manufacture of denatured alcohol. The proposed industrial alcohol commission is to be under the general direction of the Secretary of Agriculture and is to be composed of three men. It is to aid in developing denatured alcohol production in farm distilleries and in developing the use of denatured alcohol for light, heat, power and other industrial purposes. The commission is directed to build and operate for demonstration purposes one or more industrial alcohol distillery plants of several classes, and to assist groups of farmers to establish commercial plants and to protect them in establishing a market for their products. An appropriation of $250,000 is authorized in the bill to carry out these purposes.

In this connection, a prediction by Henry Ford, of Detroit, that alcohol is to supplant gasoline as fuel for motors and tractors is of interest. Mr. Ford expressed the opinion that denatured alcohol would soon be made in large quantities from farm products which now go to waste. At the same time he stated that farm tractors on his farms had operated during the year with alcohol as fuel.

Citrus By-Products Laboratory.

The Bureau of Chemistry of the United States made considerable progress through its citrus by-products laboratory at Los Angeles, Cal., in the investigation and demonstration of the uses to which citrus fruits now going to waste may be put. The bureau succeeded in producing vinegar from oranges which compared favorably with apple vinegar. It also succeeded in producing citrus acid from lemons. A success was made in the production of candied lemon and orange peels. Among the other problems which the bureau was still studying at the close of the year in this connection is the manufacture of orange juice and lemon juice, just as grape juice is now manufactured and put on the market. The bureau is also experimenting in the production of lemon oil from lemon peels and has produced a considerable quantity of this oil though not on a commercial basis, such as would permit of competition with the lemon oil brought to this country from Sicily.

In the revenue law enacted at the last session of Congress, the stamp taxes which were imposed under the old war revenue law were repealed, including those taxes on perfumes, cosmetics, chewing gum and other similar articles.

The Bureau of Chemistry of the Department of Agriculture went at considerable length into the investigation of the importation of rape seeds imported into this country from India and China and called mustard seed by importers. Many seizures were made of these seeds. It was the opinion of the bureau chemists that a large quantity of seed had been imported during the last year or two not entitled to be called mustard seeds in good faith by the importers. The object of the bureau was to establish a basis on which to do business, while the department should continue to classify the subject.

Cottonseed Industry Census.

The importance of cottonseed oil and the various uses to which cottonseed and its by-products are now put led Congress to provide for a specail census of the cottonseed industry, and one division of the bureau was detailed to this work.

Congress passed a bill for the standardization of lime barrels. Under this law there is established a large and a small barrel of lime. The large barrel consists of 280 pounds and the small barrel 180 pounds, net weight. These standard barrels must be used in lime entering into interstate and foreign commerce. The act was approved August 23.

Congress also passed a bill amending the law relating to the withdrawal from bond tax free of domestic alcohol rendered unfit for beverage or liquid medicinal uses. Where this denatured alcohol is withdrawn from a distillery warehouse for shipment to the bonded warehouse, the new law provides it shall be lawful to apply for allowance to be made for leakage or loss by accident occurring during transportation.

Appropriations by Congress.

In an emergency deficiency appropriation enacted by Congress, $300,000 was provided for the prevention of the spread of the citrus canker. In the same law an item of $20,000 was carried to prevent the spread of the disease known as the white pine blister rust.

Congress provided $15,000 in the legislative, executive and judicial appropriation law for the fiscal year 1917 to complete investigations incident to the establishment of units and standards of refrigeration and of the determination of the physical constants of materials used in the refrigeration industries, such as ammonia, aqueous ammonia solutions, carbonic acid, brines, etc. Another item in the same law was for $20,000 to be used in testing miscellaneous materials, such as varnish materials, soap materials, inks and chemicals, including supplies for the government. The third item of $10,000 was provided to develop color standards, methods of manufacture and of color measurement, with special reference to their industrial use in standardization and specification of colorants such as dyestuffs, inks, and pigments, and other products, paint, paper, and textiles, in which color is a pertinent property.

In the Sundry Civil Law of the year 1917 the United States Geological Survey was given $40,000 for chemical and physical researches relating to the geology of the United States, including researches with the view of determining geological conditions favorable to the presence of deposits of potash salts. The Survey was given also $75,000 for preparation of a report of the mineral resources of the country.

"Anti-Dumping" Webb and Barkley Misbranding Measures.

During the course of the year, under the leadership of the administration, attempts were made by Congress to prohibit the "dumpings" of goods into the markets of the United States by the foreign nations following the close of the present war in Europe, and also to prevent unfair tampering with American trade abroad during the war. Provisions for these purposes were included in the revenue law which was approved by the President last September. The anti-dumping clauses make it unlawful for any person to import into this country goods from a foreign nation and to sell them here at prices below the market prices in the principal markets of the country of their production. These anti-dumping clauses may prove of considerable assistance, it is believed, in protecting the American dyestuffs industry and the American chemical industry following the close of the war, for it is well known that in the past Germany has flooded the market here with such articles at very low prices, in order to wipe out American establishments for their production.

Another measure looking to the development of American trade was the Webb bill which would permit combinations of American firms and corporations in establishing selling agencies abroad. This bill passed the House last fall and was hurried to the Senate in the hope that it might be attached to the revenue law then pending, but the Senate failed to act upon it, and at the close of the year it was still awaiting action before the Senate Interstate Commerce Committee.

Further efforts were made to have Congress pass the so-called Stephens price-fixing bill, which would enable the manufacturer to fix the price at which his goods are to be sold by retailers.

Hearings were given by the House Interstate and Foreign Commerce Committee on this measure, but outside of that no progress was made with it. There is considerable hostility in the House committee to this measure and there seems little prospect of its becoming a law in the near future.

The Barkley bill, which is designed to prevent misbranding, false and misleading advertising and false statements on articles in foreign and interstate commerce was favorably reported to the House from the Committee on Instate and Foreign Commerce. A law to prevent fraudulent advertising in the District of Columbia was passed by Congress. This last measure, however, applies only to the Federal district. The Pomerene uniform bills of lading bill also became a law.

Chart Showing Derivation of Coal-Tar Colors.

The chart showing the derivation of the coal-tar colors, adapted from the coal-tar tree of H. von Brunck by Thomas H. Norton, of the Bureau of Foreign and Domestic Commerce, and published as a special supplement to the Reporter of October 2, 1916, has been reprinted on heavy paper, suitable for framing.

Copies can be procured from this office at 50 cents each, postpaid. The new edition has been published by request, as the first edition was exhausted within a week of publication.

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PAINT AND NAVAL STORES LEGISLATION PROPOSED IN CONGRESS DURING THE YEAR

A MEASURE of very great interest to the paint trade of the country is the bill introduced at the opening of the first session of the Sixty-fourth Congress by Senator Kenyon, of Iowa, known as the "pure paint" bill. This, after extended hearings before the Senate Committee on Manufactures, was favorably reported to the Senate in September. When Congress reopened its session in December Senator Kenyon announced that he would do all in his power to press the bill to passage at the present session. Unless favorable action can be had by both the Senate and House before March 4 the bill will die with the Congress, and it will be necessary for Senator Kenyon to reintroduce the measure in the Sixty-fifth Congress. It is the opinion of Senator Kenyon that the enactment of the bill into law would be of great importance to the public generally, and would save it millions of dollars.

Kenyon Bill Opposed.

The measure was oposed by many manufacturers of paints during its consideration in committee. Senator Penrose, of Pennsylvania, and other Senators have been unfavorable to the bill. However, it was favorably reported to the Senate by a large majority of the Committee on Manufactures, and is now on the Senate calendar.

The Kenyon bill, which is similar to a measure introduced in the Sixty-third Congress by him, and which follows the line of paint legislation which has been before the Committee on Manufactures of the Senate for several years, would prevent the manufacture, sale or transportation of adulterated, mislabeled or misbranded linseed oil, turpentine or paint. The late Senator Heyburn, of Idaho, during his service in the Senate also championed a similar bill.

In reporting the bill to the Senate the Committee on Manufactures amended it by striking out the enumeration of standards for linseed oil and requirements for boiled linseed oil, and substitute an amendment providing that the Secretary of Agriculture shall establish standards for determining the purity of linseed oil.

In July the Bureau of Census issued a summary of the general results of the 1914 census of manufacturers of the paint and varnish industry. A comparison is made with the results of a similar census taken in 1909. The paint industry in this census embraced the manufacture of colors or pigments in dry form as well as in paste form, and under varnishes there were included japans, dyers and lacquers.

Paint Industry Products $149,049,820 in 1914.

In the new census, reports were received from 855 establishments engaged in the industry, the total products of which for the year 1914 were valued at $149,049,820. Of these 855 establishments the principal business of 799 was the manufacture of paints or varnishes and 56 were engaged primarily in other industries, but produced paints or varnishes to the value of $3,507,182 as subsidiary products. The products in 1914 comprised colors or pigments, valued at $17,407,955; oil paints, $70,582,461; water paints and kalsomine, $2,202,281; varnishes and japans, $36,061,203; fillers, including putty, $3,239,174; bleached shellac, $1,806,802, and other products to the value of $17,749,944. The value of the 1914 output of all establishments exceeded that of 1909 by $21,577,601, or 16.9 per cent.

The establishments representing the paint industry showed an increase of $17,476,798, or 18.1 per cent., and those in the varnish industry $4,100,213, or 13.2 per cent. The statistics showed a decrease in the value of colors or pigments produced amounting to 4 per cent.; an increase in oil paints amounting to 23 per cent.; an increase in water paints and kalsomine amounting to 11.2 per cent., and an increase in varnishes of 13.5 per cent. The production of white lead increased by 9.4 per cent.

Standards for Naval Stores.

Early in the year the National Paint, Oil and Varnish Association sought the introduction and passage of a special bill to secure standard grades of naval stores, preventing deception in transactions in naval stores and regulating traffic therein. The bill was prepared, but the association finally decided against advocating legislation at that time in the form of a special bill. In the meantime an item was inserted in the Agricultural Appropriation bill giving the Bureau of Chemistry of the Department of Agriculture authority to go out among the producers of turpentine and rosin, demonstrating improved methods or processes of preparing these naval stores. The sum of $10,000 was appropriated for investigating the grade, weight and transportation of naval stores and the preparation of definite type samples thereon, and for the demonstration of improved methods or processes in cooperation with individual companies. This authority and the appropriation came to the Bureau of Chemistry unsolicted by it and through the demands upon Congress made by producers and users of naval stores.

Glass Types for Rosin.

Dr. Alsberg, chief of the Bureau of Chemistry, is of the opinion, however, that the bureau, through its investigations and through the establishment of definite samples made of colored glass, will be able greatly to aid the trade. A similar appropriation is contained in the Agricultural bill for the fiscal year 1918, and it is confidently predicted that it will remain in that measure in its passage through the House and Senate.

The Bureau of Census also issued a report on the production of alum in 1914, showing that in the five-year period from 1909 there had been a gain of 13.5 per cent. in quantity and 14.7 per cent. in value. Reports were received from nineteen establishments that manufactured alum in 1914, the total production being 313,712,000 pounds, valued at $3,467,969.

RECORD-BREAKING PRODUCTION OF LEAD IN UNITED STATES IN THE YEAR 1916

Average New York Price for Lead During Year Was 6.8 Cents as Compared With 4.7 in 1915—Average London Price Was 6.7 Cents.

The lead industry in 1916 made good gains in output, both in mining and smelting. The lead content of ore mined in the United States in 1916 was about 622,000 short tons, compared with 561 639 tons in 1915, an increase of 60,000 tons, or over 10 per cent. The average price of lead in 1916 was so much higher than in 1915 that the increase in value of the mine output of lead was about 50 per cent.

The State that recorded the largest gain in lead production was Missouri, which made an increase of over 25,000 tons. Good gains were also made by California, Idaho, Nevada, Utah and New Mexico.

The following estimates have been compiled from reports made to the United States Geological Survey by all the lead refineries and soft-lead smelters in operation during the year. These reports give records of the actual production for the first ten or eleven months and estimates of the output for the remainder of the year. The statistics of imports, exports and lead remaining in warehouse have been made up from the records of the Bureau of Foreign and Domestic Commerce for ten or eleven months and estimates for the remainder of the year.

Record-Breaking Production.

The production of refined lead, desilverized and soft, from domestic and foreign ores in 1916 was 579,600 tons, worth at the average New York price $78,826,000, compared with 550,055 tons, worth $51,705,000, in 1915, and with 542,122 tons, worth $42,286,000, in 1914. The figures for 1916 do not include an estimated output of 21,800 tons of antimonial lead, worth approximately $4,283,000, compared with 23,224 tons in 1915 and with 16,667 tons in 1914. Of the total production, desilverized lead of domestic origin, exclusive of desilverized soft lead, is estimated at 324,000 tons, against 301,564 tons in 1915 and 311,069 tons in 1914, and desilverized lead of foreign origin at 21,400 tons, compared with 43,029 tons in 1915 and 29,328 tons in 1914. The production of soft lead, mainly from Mississippi Valley ores, is estimated at 234,200 tons, compared with 205,462 tons in 1915 and 201,725 tons in 1914. The total production of desilverized and soft lead from domestic ores was thus about 558,200 tons, valued at $75,915,000, compared with 507,026 tons, valued at $47,660,000 in 1915, a gain of 51,000 tons. Of this gain in domestic production, about 29,000 tons was made in soft lead and 22,000 tons in domestic desilverized lead.

In consequence of the great demand for lead a considerable quantity of secondary lead (about 7,000 tons) and secondary antimonial lead (over 5,000 tons) was recovered at the regular smelters.

The final figures for the production of soft lead will show an increase of a few thousand tons over those here given, for the reason that the smelters and refiners of argentiferous lead undoubtedly treated more or less soft lead ore from the Mississippi Valley which in their preliminary estimates is not distinguished from silver-lead ore.

Imports and Exports.

The imports of lead are estimated at 20,600 short tons of lead in ore, valued at $1,575,000;; 9,200 tons of lean in base bullion, valued at $1,091,000, and 6,000 tons of refined and old lead, valued at $803,000—a total of 35,800 tons, valued at $3,468,000, compared with 51,496 tons in 1915. Of the imports in 1916 about 19,500 tons came from Mexico, against 47,124 tons in 1915.

The exports of lead of foreign origin smelted or refined in the United States showed a great decrease. They were estimated at 9,350 tons, worth $3,468,000, against 38,445 tons in 1915 and 31,051 tons in 1914. This does not include foreign lead manufactures exported with benefit of drawback, which amounted to 4,744 tons in the first half of 1916. For the last three years notable quantities of domestic lead have been exported to Europe, and the total for 1916 is estimated at 108,200 short tons, valued at $14,787,000, compared with 87,092 tons, valued at $7,796,998, in 1915.

The imports of lead for the first ten months of 1916 originated as shown in the following table:—

Lead in Ore and Bullion Imported from January to October, 1916, in Short Tons.

	Lead in ore.	Value.	Lead in base bullion.	Value.
Mexico	8,193	$616,836	8,027	$955,940
Canada	2,280	161,482	3	198
Peru	461	44,305	48	4,628
Chile	2,322	199,880	...	...
England	115	11,109	...	...
Australia ...	896	53,749	...	...
All other....	577	48,002	18	1,747
Totals	14,824	$1,135,363	8,096	$962,422

Lead Available for Consumption.

The amount of lead available for consumption during 1916 may be estimated by adding to the stock of foreign lead (domestic stocks are not known) in bonded warehouses at the beginning of the year (12,169 short tons) the imports (about 35,800 tons) and the domestic production (558,200 tons), making an apparent supply of 606,169 tons. From this are to be subtracted the exports of domestic lead (108,200 tons), the exports of foreign lead (about 9,350 tons), the foreign lead contained in articles exported with benefit of drawback (about 9,000 tons) and the stock in bonded warehouses at the end of the year (assumed to be the same as at the end of November, 8,387 tons), leaving as available for consumption 471,200 tons, compared with 426,751 tons in 1915.

High Prices Prevail.

Lead began the year at New York with a price of 5.5c. a pound, the minimum price of the year, and rose to 8c. early in April, this being the maximum figure. A long decline carried the price down to 5.95c. a pound in the early part of August. Another rise reached 7c. about the middle of September, after which the price remained stationary until early in December, when it advanced to 7.5c., and it closed the year at about that figure. The average New York price for the year was 6.8c., compared with 4.7c. in 1915, 3.9c. in 1914 and 4.4c. in 1913.

The London price of lead was higher than the New York price for the first quarter, but below it for almost the whole of the last three quarters of the year. The London price started the year at £30 7s. 6d. a long ton (6.57c. a pound) and rose to £36 7s. 6d. a ton (7.87c. a pound in the latter part of March. Paralleling the New York market, a long decline brought the price down to £28 a ton (6.06 a pound) in July, at which it remained through the month. A sharp rise followed by a decline and another rise brought the price up to £31 10s. a ton (6.82c. a pound) late in September. A decline to £30 10s. a ton (6.6c. a pound) took place early in October, after which the price remained practically stationary. The average price of lead at London during 1916 was about £31 1s. 7/10d. a long ton (6.7c. a pound).

QUICKSILVER PRICES IN 1916 HIGHEST ON RECORD—GREATEST OUTPUT SINCE 1905

The domestic output of quicksilver in 1916, according to preliminary figures, was 28,942 flasks of 75 pounds each, valued, at the average domestic price for the year at San Francisco (estimated at $125.90 a flask), at $3,643,800. This was the greatest output in quantity since 1905, and not only the greatest in value since 1875, but, except the value of $4,228,538 for that year, was the greatest in the history of the domestic industry, dating back to 1850. Compared with the final figures of output for 1915, 21,033 flasks, valued at $1,826,912, the preliminary figures for 1916 show an increase of 7,909 flasks, or 38 per cent., in quantity, and of $1,816,888, or 99 per cent., in value.

The productive States, named in order of rank, were California, Texas Nevada, Oregon, Washington and Arizona, all of which increased their output except Nevada, although Arizona has produced only a nominal quantity to date and Washington had produced none prior to 1916.

Increase in California.

The output for California in 1916 was 20,550 flasks, valued at $2,587,245, against 14,283 flasks, valued at $1,174,881, in 1915. Quicksilver prospecting and mining were generally active in California in 1916, and some of the large furnaces were worked profitably upon ores of lower grade than has ever been reported in the history of the industry.

Texas and Nevada.

The combined output of Texas and Nevada in 1916 was 7,975 flasks, valued at $1,004,052, against 6,744 flasks, valued at $651,611, in 1915.

The combined production of Oregon and Washington in 1916 was 412 flasks, valued at $51,870, against a nominal output from Oregon alone in 1915.

Highest Prices of Record.

Never before in the history of the industry have such prices been obtained for quicksilver as in the first three months of 1916. The average San Francisco domestic price for January was $222 per flask, and this rose to $295 for February, during which some metal is reported to have been sold for $400 a flask. The average declined to $219 in March, to $141.60 in April, to $90 in May and to $74.70 in June. The price then steadied, and from July to December the monthly averages did not fall below $74.50 nor rise above $81.20. The year ended with an average for December of about $80 per flask.

The high prices were due to large demands resulting from war conditions, which greatly increased domestic use in manufacture and kept down competing imports. Notwithstanding increased output the demand apparently absorbed about all the available metal, and few sales were reported at a rate less than a dollar a pound.

Imports and Exports.

For the first nine months of 1916 the imports of quicksilver were 5,245 flasks, at an average value of $93.47 per flask. Of these imports, 3,014 flasks came in during the first quarter of the year, 1,698 flasks during the second, and only 533 during the third. The total imports for consumption for 1915 were 5,625 flasks, valued at $282,752.

Exports of quicksilver for the first ten months of 1916 were 6,689 flasks, at an average value of $76.01 per flask. The exports were twenty flasks for the first quarter, 1,350 flasks for the second, 3,444 flasks for the third, and 1,875 flasks for October alone.

Conditions Prosperous.

Altogether conditions for the quicksilver industry are prosperous. With increasing output, steady demand at high prices, decreasing imports, and increasing exports, the quicksilver mines may look back upon 1916 as the best year within a generation, and the outlook for the immediate future is correspondingly bright.

Oil of Lemon-Grass Production in United States.

The attention of growers of volatile oil plants is called to the possibilities of profit in the production of lemon-grass oil by the United States Department of Agriculture. Because of the overhead charges for a plant which will be in use only a few weeks in the year, the production of lemon-grass oil by itself, it is said, probably will not be profitable, but by growing it in conjunction with other volatile oil plants, a long distilling season may be attained and greater use obtained from the distilling plant.

At the present time about 100,000 pounds of lemon-grass oil are used in the United States, chiefly in the perfume and soap industries. Practically all of this oil is imported, most of it being produced in the East Indies. There seems to be, however, no reason why lemon grass can not be grown successfully in the subtropical portions of the United States.

The plant does best on well-drained, sandy loam, but it is suggested that the high pine lands of the Florida peninsula would be suitable. Newly cleared sandy pine land without any previous application of lime has given good results. On the other hand, poorly drained soil should not be used. The crop, it is said, may be planted with safety where the temperature does not fall below 25 degrees F. On the sandy Florida soils experiments have shown that lemon grass requires rather more potash than other grasses.

The first year two cuttings can be made, thereafter three harvests a year should be expected. Close cutting is not profitable because of the low oil content in the lower portion of the plant.

Commercially, the investigators of the Department of Agriculture have had no difficulty in selling samples of the oil produced in their experiments in Florida at a price equivalent to that obtained for the better grades of imported oil.

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WAR-TIME MARKET PRICE STUDIES, FROM AUGUST, 1914, TO JANUARY, 1917.

In the following tables will be found a comparison of the prices prevailing in the New York markets for every item customarily carried in the Reporter's wholesale prices current, the quotations being those for the first of the month on the opening of the quarter, from the first war month, August, 1914, until the first of the present year.

In any study of war-time conditions, and as a progressive record of price changes during this most momentous period, these tables will be found invaluable.

CHEMICALS.

HEAVY CHEMICALS.

	1917.	1916				1915				1914.
	Jan. 1.	Oct.	July.	April.	Jan.	Oct	July.	April.	Jan.	Aug.
Bleach, over 35%, per lb	4⅝@6½	4¼@6	5½@8	8@8½	—@14	2½@3	1⅝@1¾	1⅝@1½	1⅝@1⅝	1¾@1 3/10
Salt cake, ground, 100 lbs	75@—	55@65	50@—	60@70	55@65	55@65	55@65	55@65	55@65	55@65
Soda ash, 48%, bags, f. o. b. works, 100 lbs	—@—	—@—	—@—	—@—	1.85@2.10	75@80	67½@72½	67½@72½	67½@72½	67½@72½
light, 58%, bags, flat, lb	3.00@3.10	3¼@3½	2⅝@3	3½@3¾	1¾@2	.006½@.007	.005¾@.006¾	.005¾@.006¼	.005¾@.006¼	.005¾@.006¼
Soda, bicarb., English, lb	3½@3¾	3½@3¾	3¼@3⅜	3½@3⅝	3⅛@3⅜	3½@3⅝	3½@3⅝	3½@3⅝	3½@3⅝	2⅝@3
American, f. o. b. works, 100 lbs	1.75@1.90	1.65@1.75	1.65@1.80	1.65@1.80	1.20@1.30	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10
second hands, spot, 100 lbs	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Soda, caustic, domestic, f. o. b. works, 60%, 100 lbs	4⅜@4¾	3⅞@4¼	—@—	—@—	—@—	—@—	—@—	—@—	1.55@1.60	1.55@1.60
74@76%, drums, lb	5@5¼	4@—	4½@4¾	6¼@6¼	5½@5¾	5¼@5½	.02¾@.0285	.016@.017	.0140@.0147½	.0142½@.0147½
flake, 70%, lb	5⅝@6	5@5¼	6¼@6¾	6¼@6¼	6½@6¾	5¼@5½	3¼@3¾	2¼@2½	2@2¼	2@2¼
Sal soda, American, f. o. b. works, 100 lbs	1.10@1.25	1.00@1.15	1.00@1.15	1.10@1.35	85@1.00	60@80	60@80	60@80	60@80	60@80
Sulphide of soda, 30%, crystals, bbls., lb	2@2¼	2@2¼	2@2¼	2½@2½	2@2½	2@2½	1¾@2¼	1¾@1¾	1½@1¾	1¼@1¾
60%, fused or broken, iron bbls., lb	3@3¼	3@3¼	4@4¼	4½@5½	5¾@—	3@3½	3@3¼	2¼@2½	2¼@2½	2¼@2½

ACIDS.

	1917.	1916				1915				1914.
	Jan. 1.	Oct.	July.	April.	Jan.	Oct.	July.	April.	Jan.	Aug.
Acid, acetic, 28%, bbls	4½@5	4½@5	6@6¼	8½@9½	6@7	3.00@3.15	2.50@2.65	2@2¼	1¾@2	1¼@.0165
56%	12@14	10¼@11	11@12	17@19	10@12	—@—	—@—	—@—	—@—	—@—
glacial acetic, 99%, carboys	30@40	27@28	45@50	50@—	30@35	15@—	10¼@11	7¾@8¼	7¾@8¼	7¾@8¼
hydrofluoric, 30%, in bbls., lb	5@5½	5@5½	5@5¼	3@3½	3@3½	3@3½	3@3½	3@3½	3@3½	3@3½
48%, carboys, lb	11@—	11@—	11@—	6@6½	6@6½	6@6¼	6@6¼	6@6½	6@6¼	6@6½
52%, carboys, lb	19@—	19@—	19@—	6¼@7	6½@7	6¼@7	6½@7	6¼@7	6¼@7	6¼@7
lactic, 22%	7@7½	4¼@—	2¼@2½	2¼@2½	2¼@2½	2¼@2¼	2¼@2¼	2¼@2½	2¼@2½	.019@.02
oxalic, in casks	14@15	10@—	6@6½	7@7¾	5@5½	4½@4½	2½@2½	18@18½	13@14	7¼@7½
phosphoric, 50%	47@50	60@62	9@—	3.60@4.60	3.60@4.60	3.60@4.60	3.60@4.60	3.60@4.60	3.60@4.60	3.60@4.60
sulphuric, 60 deg	1½@2	1½@2	1@1¼	2@2¼	1¼@1¾	1@1¼	.0085@1	.0085@1	.0085@1	.0085@1
66 deg	1@1½	1@1½	2@2¼	2½@3	2@2½	1¾@2½	1¼@2	.01@.011	.01@.011	1@.011
battery acid, carboys	1½@2	1½@2	4@5	2½@3	2¼@3	1¾@2½	1½@2	1@1¼	1@1¼	1@1¼
oleum, tank cars	2@2½	2¼@2½	5@6	2½@3	2¼@3	1¾@2¼	1½@2	1¼@1½	1¼@1¼	1¼@1¼
muriatic, 18 deg., carboys	1½@1¾	1¾@2	2½@2¾	2½@3	1¾@2	1¾@2	1¼@1¾	.0115@.0165	.0110@.0165	.0115@.0165
20 deg	1¾@2	2@2¼	2¾@3	2¾@3¼	2@2¼	2@2¼	1¾@2	.013@.0165	.013@.0165	.013@.0165
22 deg	2@2¼	2¼@2½	3¼@4	3@3½	2¼@2½	2¼@2½	2@2¼	.0145@.0175	.0145@.0175	.0145@.0175
Aqua fortis, 36 deg., carboys	5¼@5½	6@6¼	7@7¼	6@6¾	6@6¾	6@6¾	5½@6¼	3¾@4½	3¾@4½	3¾@4½
38 deg	5½@5¾	6¼@6¾	7¼@7½	6¼@7	6¼@7	6½@7	6@6¼	4@4½	4@4½	4@4½
40 deg	5¾@6	6½@6¾	7½@7¾	6¾@7¼	6¾@7	6¾@7¼	6¼@6¾	4¼@4¾	4¼@4¾	4¼@4¾
42 deg	6@6¼	6¾@7	7¾@8	7@8	8@9	8@9	7¾@8	4½@5	4¾@5	4¾@5
nitric, 36 deg., in carboys	5½@5¾	6¼@6½	7¼@7½	6¼@7	6¼@7	6¼@7	5¾@6¼	3¾@4¼	3¾@4¼	3¾@4¼
38 deg	5¾@6	6½@6¾	7½@7¾	6¾@7¼	6¾@7¼	6¾@7½	6¼@6¾	4¼@4¾	4¼@4¾	4¼@4¾
40 deg	6@6¼	6¾@7	7¾@8	7@7½	7@7½	7@7½	6½@6¾	4½@4¾	4½@4¾	4½@4¾
42 deg	6¼@6½	7@7¼	8@8¼	8¼@8½	8¼@9¼	8¼@9¼	7¾@8¼	4¾@5¼	4¾@5¼	4¾@5¼
tartaric, crystals	66@70	66@70	65@74	63@77	52@56	46½@47	48@50	38@38½	40%@41	—@30¼
powdered	63@65	65@—	65@73	62@71	38½@38¾	41@41½	—@30½	51@55	46@47	48@50

MISCELLANEOUS CHEMICALS.

	1917.	1916				1915				1914.
	Jan. 1.	Oct.	July.	April.	Jan.	Oct.	July.	April.	Jan.	Aug.
Acetate of lime, 100 lbs	3.50@3.55	3.50@3.55	7@7.05	7.00@7.05	@@6.10	4@4.05	3.50@3.55	2.50@2.55	2.00@2.05	1.50@1.55
Acetate of lead, brown, broken, lb	11¼@—	11¾@—	13¾@14	11¾@12	10¾@11	9¾@10	9¼@10	7¼@7½	7¼@7½	7¼@7¼
white, crystals	13@—	13½@—	15¾@15½	13¾@13¾	12⅝@12¾	11¾@12½	11¼@12½	9¼@10¾	9¼@9¾	9¼@9¾
white, broken	12¼@—	13¼@—	14⅝@15¼	12¾@13¼	11⅞@12¼	10⅞@12½	10⅞@11½	8¾@9	8¾@9	8¾@9
Alum, lump	4@4½		4@4½	4¼@4½	4@5	3½@5	.024@.025	2½@2¾	2½@2¾	.0175@.02
ground	4½@4¾	4½@4¾	4½@4¾	4½@4¾	4¼@4½	3¾@5 1/10	.025@.026	.020@.027	.020@.027	.0185@.02
Anhydrous ammonia	—@25	—@25	—@25	—@25	—@25	—@25	—@25	—@25	—@25	—@25
Antimony, needle, glassmakers' grade	20@—	20@—	25@—	40@—	35@—	25@26	25@26	12@13	6¼@7½	3¾@4
Antimony oxide	25@—	25@—	30@—	50@—	35@—	—@30	22@23	12@13	10@12	6@6¼
Aqua ammonia, drums, 16 deg., lb	2¾@3½	2¾@3½	2¾@3½	2¼@2¼	2¼@2½	2¼@2½	2¼@2½	2¼@2½	2¼@2½	2¼@2¾
18 deg	3½@4½	3½@4½	3½@4½	2¾@3	2¾@3	2¾@3	2¾@3	2¾@3	2¾@3	2¾@3
20 deg	4@5	4@5	4@5	3¼@3¼	3¼@3½	3¼@3½	3¼@3½	3¼@3½	3¼@3½	3¼@3¼
26 deg	5½@6	5½@6	5½@6	4¾@5¼	4¾@5¼	4¾@5¼	4¾@5¼	4¾@5¼	4¾@5¼	4¾@5¼
Ammoniac, sal, gray	12@15	10@15	10@15	6¼@7	6¼@7	6@6¼	5¾@6	5½@5¾	6¼@6½	5¾@6¼
granulated, white	17@18	—@10½	9@10	8¼@9¼	8¼@9¼	7¾@8½	7¾@10	7¼@8	7@7½	6¼@6¾
lump	18@20	18@20	18@20	10@12	10@12	10@12	10@12	10@12	10@12	10@10¼
Argols	2¼@18	2¼@18	2¼@18	2¼@18	2¼@18	2¼@18	2¼@18	—@18	—@18	2¾@19
Arsenic, white	8@8¼	5¾@6	6½@6½	6½@—	3¾@4½	3¾@4	3¼@4	4@4½	4@4½	.028@.03
red	65@70	65@70	65@70	65@70	—@—	8¼@9	8¼@9	8@8½	—@8	5¾@6¼
Arsenate of lead	8¼@9	8½@9	8½@9	8½@9	6¼@7	5½@6	5½@6	5½@6	5½@6	4¾@5¼
Barium chloride, lb	4¾@5¼	5@5½	5½@6	5½@6	—@7	.0475@6	.0475@6	3@—	.025@.03	.016@.01625
Brimstone, long ton	—@35.00	—@35.00	—@35.00	29.00@30.00	22.00@22.50	22.00@22.50	22.00@22.50	22.00@22.50	22.00@22.50	22.00@22.50
Carbonate of copper	35@37	32@34	—@45	40@45	19½@20¼	18¾@18¾	18¾@18¾	14¼@15	13@15	13¼@15
Carbon tetrachloride, in drums	16½@17	16@16½	17½@18	17@18	18@20	15½@16	16@17	15@17	14@15	7@7¾
Cream tartar, crystals	—@40	—@40	42½@44	42½@46	37¼@39	34½@35	35@—	28@30	30@31	—@23¾
powdered, 99%	—@40	—@40	43@44½	42½@46	37@39	34@35	35@—	28@30	30@31	—@24
Chlorate of soda	25@35	28@35	35@—	—@35	—@25	14@16	14@16	14@16	—@14	7¼@8
Chloride of calcium, 70@75%, lump, ton	23.00@26.00	26.60@31.00	—@11.78	—@11.78	—@11.78	—@11.78	—@11.78	—@11.70	—@11.70	12.00@12.50
Copperas	1@1½	1¼@1½	1¼@2	1¼@2¼	.0055@.006	.0055@.006	.006@.007	.0065@.0075	.0065@.0075	.0065@.0075
Glauber's salt, bags	60@65	60@65	65@70	70@80	60@75	60@75	60@70	60@75	60@75	60@75
Nitrate of lead	15½@16	15½@16	15½@16	17@18	13¼@14	11¼@12	11¼@12	—@8	—@8	7¼@8
Potash, chlor., crys	65@70	48@70	53@70	—@75	45@50	35¼@36	30@30¼	30@30¼	—@15	7¼@7¾
powdered	65@70	48@70	53@70	—@76	45@50	35½@36	30@30¼	30@30¼	—@15¼	7¼@8
carb. cal., 80@85%	38@40	50@—	80@85	—@90	45@50	23@24	—@21	15@15¼	5@6	3@3½
calcined, 96@98%	50@60	60@—	95@1.00	—@1.10	45@50	28@30	—@20	18@18½	7@8	4¼@4¾
hydrated, 80@85%	55@65	70@—	95@1.00	—@1.15	45@50	24@25	—@20	16@17	—@—	3¾@4¾
caustic, 88@92%	90@95	85@90	83@90	95@1.00	45@50	24@25	—@20	20@25	8@9	.0455@.0465
Saltpeter, crude	—@—	—@—	—@—	—@—	65@70	39@41	—@40	—@—	—@—	4¾@5
refined	31@35	28@30	29¾@30¾	35@38	35@38	18@19	17@—	12@12½	7@8	4¾@5¾
Sulphate, alumina, low grade	2@2½	4@4½	4@4½	4@4½	3@4	1.40@1.55c	1.10@1.3c	1.1@1.3c	1.1@1.3c	.009@1¼
high grade	3½@4	5@6½	5@6¼	5@6½	4@4½	1¾@2	1¼@1¾	1¼@1¾	1¼@1¾	1¼@1¾
Bisulphite of soda, powdered	5¾@6	5½@5¾	5½@5¾	6@7	5½@5¾	5½@5¾	5½@5¾	5½@5¾	5½@6	2¼@2¾
Tin, oxide	45@50	44@46	46@48	60@62	46@48	39@41	44@45	35@36	38@40	5¼@6
Verdigris	40@42	36@37	40@42	40@42	38@40	—@35	35@40	30@32	30@32	36@38
Blue vitriol, 100 lbs	13@14	8½@10¼	9.00@10.00	17@20	14½@15½	6¾@7	7¼@7½	6@6¼	.0435@.0455	.045@.047
Zinc, carbonate	24@26	24@26	24@28	20@24	13@15	12@13	13@14	8¼@9	8¼@9¾	8½@9
chloride	13@14	13@14	13@14	14@15	8@8½	8@8¼	8@8¼	4½@4¾	4½@4¾	4½@4¾
sulphate	6½@7	6½@7	6¼@7	6¼@7	6¼@7	6¼@7	6¼@7	2½@2¾	.0235@.0265	.0235@.0265

DYESTUFFS.

DYES.

	1917.	1916				1915				1914.
	Jan. 1.	Oct.	July.	April.	Jan.	Oct.	July.	April.	Jan.	Aug.
Acetate of soda	9@14	10½@11	15@15½	14@15	9¼@9¾	5½@6¾	4@4½	4@4½	5@6	3¾@4½
tannic, commercial	65@66	65@66	65@66	65@66	65@66	65@66	65@66	65@66	60@66	35½@37
crystals	70@77	70@77	70@77	70@77	70@77	70@77	70@77	70@77	70@77	58@65
Albumen, egg	76@78	72@75	80@82	65@70	88@90	55@60	55@60	50@75	50@75	40@70
blood	33@48	30@37	30@35	30@35	30@35	30@35	30@35	30@35	40@45	19@25
Alizarine, red	—@—	—@—	—@—	—@—	25@30	25@30	25@30	25@30	—@—	15½@16½
Alumina, chloride	4@4.10	4@4.10	.04@.041	.04@.041	.02@.021	.02@.021	.02@.021	.02@.021	.02@.021	.018@.01825
Aniline oil	22@24	27@30	45@50	90@—	95@1.10	95@1.50	1.30@1.35	1.30@—	30@40	10¼@11
salts	29@33	40@55	65@70	1.15@1.50	1.35@1.50	1.35@1.50	1.25@1.30	1.30@—	35@40	8¾@9
Annatto, fine	45@60	45@60	45@60	45@60	40@60	40@60	40@60	40@60	40@60	32@35
seed	15@16	15@16	15@16	17@18	8@8½	8@8½	8@8½	8@8½	10@14	7@7½
Antimony, salt, 75%	50@*60	50@*60	50@60	50@60	30@35	30@35	30@35	30@35	30@35	14@14½
65%	45@*50	45@*50	45@60	45@60	26@33	26@33	26@33	26@33	26@33	11¾@12¼
47%	40@*45	40@*45	40@45	40@45	24@29	24@29	24@29	24@29	24@29	9¾@10
Bichloride of tin, 50 deg	13½@14	13½@14	15¼@15¾	15¾@16	13¾@14	11¼@11½	11¾@12	14½@15	9¾@10	11¼@11¾
Bichromate of potash	42@43	38@50	43@45	75@—	45@—	20@21	21@—	16@17	12@13	6¾@7
Bichromate of soda	19@20	25@29	30@41	60@75	25@—	10@—	10@11	4¾@5½	4¾@5½	4¾@4¾
Cochineal, Teneriffe, silver	95@98	95@98	95@98	80@82	55@—	—@—	—@—	—@—	—@—	—@—
rosy, black	85@90	85@90	85@90	82@85	—@65	—@65	—@65	—@65	—@65	—@45
gray, black	75@80	75@80	—@—	—@—	60@75	60@75	60@75	60@75	60@75	48@50
fine, Madras	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	50@52
Cudbear, French	70@*80	70@*80	70@80	70@80	25@30	25@30	25@30	25@30	25@30	12@13
concentrated	75@*85	75@*85	75@85	75@85	40@50	40@50	40@50	40@50	40@50	23@28
English	18@20	20@25	70@80	70@80	15@20	15@20	15@20	15@20	15@20	7¾@10
Cutch, bales	10@15	9@15	12¼@18	15@20	12@—	12@—	7¼@8	6¼@7½	6¼@8	5@6
boxes	12@16	12@16	15@25	15@25	13@30	13@15	8@9	8@9	—@—	—@—
Dextrine, imported, pots	12@13	12@13	12@13	12@13	10@12	10@12	10@12	10@12	10@12	6@7
British gum	3.85@3.91	3.65@3.71	.032@.0326	.0325@.0336	.0305@.0316	.0315@.0320	.0335@.0346	.0315@.0326	.0302@.0313	.0312@.0323
domestic potato	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	5½@7
Divi divi, ton	55.00@—	50.00@55.00	65.00@67.00	55.00@56.00	50.00@55.00	40.00@45.00	35.00@40.00	40.00@45.00	55.00@75.00	45.00@55.00

Export	*Import*
Bichromate of Potash	Bichromate of Soda
Borax	Boracic Acid
Paraffine Wax	Sulphate of Aluminium
Sulphate of Copper	Olein
Castor Oil	Glycerine
Chloride of Lime Bleach. In 10-lb. tins	Caustic Soda Solid, also Ground, in 10-lb. tins
Soda Ash	Tartaric Acid
Citric Acid	Salol
Salicylates	Logwood, Solid and Liquid
Aniline Oil	Aniline Salt
Tallow	Soap

Will cable quotations on request

SPECIAL PACKING FOR EXPORT

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Office and Warehouse: 237 Water Street

NEW YORK, N. Y., U. S. A.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Flavine, lb.	1.25@1.50	1.25@1.50	1.25@1.50	60@80	60@80	60@80	60@80	60@80	60@80	40@60
Fustic, stick, ton	30.00@35.00	30.00@35.00	30.00@35.00	25.00@30.00	22.00@30.00	22.00@30.00	18.00@30.00	18.00@30.00	18.00@30.00	12.00@23.00
young root	—@45.00	—@45.00	—@45.00	—@45.00	—@45.00	—@45.00	—@45.00	—@45.00	—@45.00	—@45.00
Gambier, spot, ex-store, lb.	11½@—	9½@10	12@12½	16@18	18@—	11@11½	8@9	8@8½	5½@6	4½@4¼
Hypo. of soda, bbls., cwt.	2.00@2.25	2.00@2.25	2.25@2.50	2.25@2.50	2.75@3.00	1.60@2.00	1.60@2.00	1.60@2.00	1.60@2.00	1.30@1.50
kegs	2.15@2.30	2.15@2.30	2.40@2.65	2.40@2.65	2.90@3.10	1.75@2.10	1.75@2.10	1.75@2.10	1.75@2.10	1.40@1.60
Indigo, Bengal, lb.	3.50@5.00	3.50@5.00	3.50@5.00	3.50@5.00	3.00@3.50	3.00@3.50	3.00@3.50	3.00@—	2.00@—	67½@95
Kurpahs	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	50@60
Guatemala	3.00@4.50	3.00@4.50	3.00@4.50	3.00@4.50	3.00@3.50	3.00@3.50	3.00@3.50	—@—	—@—	65@80
Madras	1.03@—	2.50@—	2.50@—	1.50@—	1.50@—	02@93	93@95	1.22@—	1.22@—	58@65
J. (synthetic)	1.50@—	1.35@—	2.00@—	1.90@—	1.35@—	65@—	65@—	65@—	65@—	18@20
Logwood, stick, ton	25.00@38.00	35.00@45.00	55.00@65.00	55.00@100.00	24.00@30.00	24.00@30.00	24.00@30.00	18.00@20.00	18.00@20.00	15.00@20.00
roots	28.00@35.00	40.00@—	70.00@80.00	70.00@100.00	18.00@—	18.00@—	18.00@—	12.00@15.00	12.00@15.00	11.00@14.00
Madder, Dutch, lb.	28@30	28@30	28@30	28@30	24@25	17@19	17@19	20@22	14@20	12@14
Myrabolans, ton	60.00@65.00	52.00@55.00	56.00@57.00	39.00@40.00	39.00@40.00	34.00@—	30.00@35.00	30.00@35.00	40.00@50.00	27.00@34.00
Nitrate of iron, commercial	2½@3	2½@3	2½@3	2½@3	1¾@2	1¾@2	1¾@2	1¾@2	1¾@2	1⅛@1¼
true	5@6	5@6	5@6	5@6	4@4½	4@4½	4@4½	4@4½	4@4½	4@4½
Nutgalls, blue, Aleppo	nominal	35@50	35@50	35@50	18@30	18@30	18@30	18@30	18@30	16@16½
Chinese	18@20	18@20	27@28	35@45	17@25	17@25	17@25	17@25	17@25	15@15½
Persian berries	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	15@—
Phosphate of soda, com.	6@7	7@8	7@8	5½@6	2½@2¾	2½@2¾	2½@2¾	2½@2¾	2¼@2¾	.021@.023
Prussiate of soda	34@36	45@55	90@92	1.20@1.25	67½@70	41@45	35@40	12@—	14@16	8¾@9
Prussiate of potash, yellow	92@95	65@75	1.20@1.30	1.75@1.80	90@1.00	82½@85	80@90	41@45	22@24	12¼@12⅝
red	2.50@3.00	1.75@2.00	—@—	—@—	5.00@—	2.50@—	1.25@—	80@—	55@—	21@23
Quercitron, ton	75.00@80.00	75.00@80.00	75.00@80.00	35.00@45.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	22.00@25.00
Sago flour, lb.	4¾@5	4¾@5	4¾@5	3@3½	2¾@2¾	2¾@2¾	2¾@2¾	2¾@2¾	2¾@2¾	2¾@2¾
Silicate of soda, liquor	1¼@1½	1@1½	1.25@1.50	1.25@1.50	85@1.10	85@1.10	85@1.10	85@1.10	85@1.10	65@1.50
crystals	1¾@2¾	2@3	2@3	2@3	2@2½	2@2¼	2@2¼	2@2¼	2@2½	2@2¼
Soluble oil, 50%	10@12	10@12	13@14	16@18	6½@10	6½@10	6½@10	6½@10	6¼@10	6½@10
75@85%	14@16	14@16	17@20	20@25	11@12	11@12	11@12	11@12	11@12	11@12
Starch, corn, pearl, cwt.	2.85@2.91	2.65@2.71	2.25@2.31	2.25@2.36	2.05@2.16	2.15@2.26	2.35@2.46	2.15@2.26	1.99@2.10	2.09@2.20
potato, lb.	6@8½	6@8½	5@6¼	6@6¼	5¼@5½	5¼@5½	5¼@5½	5¼@5½	5¼@5½	5¼@5½
rice	8@10	8@10	8@10	8@10	7@8	7@8	7@8	7@8	7@8	7@8
wheat	5@6	5@6	4@6	5@6	4⅞@5⅛	4⅞@5¼	4⅞@5¼	4⅞@5¾	4⅞@5¼	4⅞@5¼
Sumac, Sicily, No. 1, 29% (tannic acid), ton	80.00@—	68.00@—	75.00@—	76.00@—	60.00@—	65.00@68.00	65.00@—	65.00@67.00	—@—	—@63.50
Tin, crystals, lb.	29½@30	29½@30	35@35½	32@32¼	28@28½	25@25½	26@26½	26@26½	23@23½	23@—
Turmeric, Madras	8¾@9	8¾@9	—@—	—@—	4¾@4¾	4¾@4¾	4¾@4¾	4@4¼	4@4¼	4¼@4¾
Aleppy	—@—	—@—	—@—	—@—	4¾@4½	4¾@4½	4¾@4¾	4¼@4½	4¼@4½	4¼@4½
Pubna	—@—	—@—	—@—	—@—	5@5½	5@5½	5@5½	4@—	4@—	5½@5¾
China	8½@8¾	8½@8¾	—@—	—@—	3¾@3¾	3¾@3¾	3¾@3¾	3@3½	3@3½	3½@4¾
Cochin, bulbs	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Turkey red, oil	10@24	10@24	15@24	15@24	5@16	5@16	5@16	5@16	—@—	5½@9
Zinc dust	20@33	22@30	28@30	32@38	35@38	37@38	32@33	16@—	9@10	5¾@6

CHIPPED DYEWOOD.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Barwood, lb.	6@8	6@8	6@8	7@8	7@8	7@8	3@4	2@2½	2@2½	2@2½
Canwood	18@20	18@20	18@20	16@20	16@20	16@20	8@9	6@7	6@7	6@7
Fustic	6@7	6@7	6@7	5@7	5@7	5@7	2@2½	1½@2	1½@2	1½@2
Hypernic	7@8	7@8	7@8	6@8	6@8	6@8	3@4	2@3	2@3	2@3
Logwood	2¾@5	4@5	9@9¼	15@18	4@6	4@6	2@2½	1¼@1½	1¼@1½	1¼@1½
Red sanders	12@14	12@14	12@14	12@14	8@10	8@10	4@5	3@5	3@5	3@5

DYESTUFF EXTRACTS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Archil, double, lb.	25@—	35@—	50@—	50@—	44@45	40@45	14@15	15@17	15@17	14@15
concentrated	45@—	45@—	55@—	55@—	50@55	50@55	17@19	10@12	10@12	8@10
Barberry, French	35@40	35@40	35@40	35@40	35@40	35@40	35@40	28@35	28@35	22@28
Chestnut	3@3½	5@6	4@5	4½@4¾	5@5½	6@7	6@7	5@5½	5@5½	3¾@4
Oak	4@4½	6@8	6@8	8@8½	8@8½	8@8½	8@8½	8@8½	8@8½	8@8½
Hemlock	4@4½	5½@6	5@5¼	4½@5	5¼@—	4@5	2¾@3½	2¾@3¼	2¾@3¼	2¾@3¼
Fustic, solid	40@—	35@40	35@40	55@—	55@—	15@—	8@11	8@11	8@11	8@11
liquid, 51 deg.	15@20	22@26	26@30	35@—	40@—	9½@11	6@8	6@8	6@8	6@8
Gall	17@20	16@20	25@28	20@22	15@—	12@15	12@15	12@15	12@15	12@15
Indigo	30@45	30@45	35@40	60@—	50@60	50@60	50@60	6@10	6@10	6@10
Logwood, solid	30@35	45@50	70@75	85@—	90@—	95@—	12@—	6@12	6@12	6@12
liquid, 51 deg.	15@20	30@45	35@40	65@75	50@80	50@70	6@8	5@10	5@10	5@10
42 deg.	10@16	25@—	35@—	60@—	50@—	50@—	5@7	4@6	4@6	4@6
crystals	35@40	55@60	90@—	95@—	1.15@—	1.20@—	15@—	10@15	10@15	10@15
Quebracho, solid	14@16	14@16	14@16	14@16	20@—	12@13	4¾@5¼	4¾@5¼	4¾@5¼	4¾@5¼
51 deg.	7@8	7@8	10@—	14@—	15@—	6@7	3¼@4	3¼@4	3¼@4	3¼@4
42 deg.	6½@—	6½@—	9@—	14@—	14@—	5@6	2¾@3	2¾@3	2¾@3	2¾@3
Quercitron	11@12	11@12	15@20	25@35	30@—	12@13	6@6	2¾@3	2¾@4	2¾@4
Palmetto	4@•5	4@•5	4@5	4@5	3@4	3@4	3@4	2¼@2½	2¼@2½	2¼@2½
Persian berry	20@25	20@25	20@25	20@25	12@14	12@14	12@14	12@14	12@14	12@14
Sumac	7@13½	7@13½	9@16	10@18	10@17½	6@6¼	3¾@6¼	3¾@6¼	3¾@6¼	3¾@6¼

FERTILIZERS.

AMMONIATES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Ammonia, sulph., prompt	4.50@—	4.00@—	3.40@—	3.70@4.00	4.00@—	3.30@—	3.25@—	3.10@—	2.65@2.80	2.60@—
futures	4.50@—	4.00@—	3.40@—	3.70@4.00	4.00@—	3.40@—	3.25@—	3.05@—	2.55@—	2.65@—
Fish scrap, dried, 11% ammonia, 14% bone phosphate, f. o. b., delivered Baltimore (unit)	4.50&10	3.60&10	3.00@10.00	3.75@10.00	3.75@10.00	2.75@10.00	nominal	3.35@10.00	3.35@10.00	3.00@10.00
wet, acidulated, 6% ammonia, 3% phosphoric acid, delivered	4.25&10	Nominal	nominal	nominal	nominal	nominal	—@—	—@—	—@—	—@—
Ground fish guano, imported, 1 and 11% bond phosphate, c. i. f. New York, Baltimore or Philadelphia	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Tankage, 11% and 15%, f. o. b. Chicago	3.90&10	3.15&10	2.85@10.00	2.85@10.00	3.20@10.00	2.30@10.00	2.20@10.00	2.95@10.00	2.95@10.00	2.87½@—
10% and 20%, f. o. b. Chicago, ground	3.75&10	3.05&10	2.55@10.00	2.85@10.00	3.20@10.00	2.30@10.00	2.30@10.00	3.05@10.00	3.05@10.00	2.95@10.00
9% and 20%, f. o. b. Chicago, ground	3.90&10	3.15&10	2.65@10.00	2.95@10.00	3.20@10.00	2.30@10.00	2.30@10.00	3.05@10.00	3.05@10.00	2.95@10.00
concentrated, f. o. b. Chicago, 14% to 15%	3.70&10	2.90&10	2.50@10.00	2.75@10.00	3.10@10.00	2.30@10.00	2.15@10.00	2.95@10.00	2.95@10.00	2.87½@—
Garbage tankage, f. o. b. Chicago	15.00@—	9.00@—	9.00@—	9.00@—	9.00@—	9.00@—	9.00@—	9.00@—	9.00@—	9.00@—
Sheep manure, concentrated, f. o. b. Chicago, ton	—@—	13.00@—	13.00@—	13.00@—	13.00@—	13.00@—	13.00@—	13.00@—	13.00@—	13.00@—
Hoofmeal, f. o. b. Chicago, unit	4.00@—	2.60@2.70	2.60@2.70	2.60@2.70	2.60@2.70	2.60@2.70	2.60@2.70	2.60@2.70	2.60@2.70	2.60@2.70
Dried blood, 12@13%, ammonia, f. o. b. N. Y.	4.05@—	3.35@—	2.80@—	3.00@—	3.40@—	2.65@—	2.45@—	2.75@—	3.25@—	3.00@—
Chicago	3.90@—	3.20@—	2.65@—	2.80@—	3.25@—	2.40@—	2.30@—	2.60@—	3.15@—	2.85@—
Nitrate of soda, 95%, spot, 100 lbs.	3.25@—	2.90@2.95	3.10@—	3.40@—	3.25@—	2.55@—	2.35@—	2.27½@—	1.90@—	2.07½@—
futures, 95%	3.25@—	2.90@2.95	3.07½@—	3.10@—	3.20@—	2.55@—	2.35@—	2.25@—	1.90@—	2.12½@—

PHOSPHATES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Acid phosphate, ton	11.50@12.00	10.50@12.00	80@85	80@85	80@85	55@60	45@50	45@50	45@50	45@50
Bones, rough, hard, ton	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00	22.50@24.00
soft, steamed, unground	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00	21.50@22.00
ground, steamed, 1¼% ammonia and 60% bone phosphate	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00	20.00@21.00
ditto, 3% and 50%	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00	23.50@24.00
raw, ground, 4% ammonia and 50% bone phosphate	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00	28.50@30.00
South Carolina phosphate rock, kiln dried, f. o. b. Ashley River	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75
Florida land pebble phosphate rock, 68%, f. o. b. Tampa	2.00@2.25	2.75@3.00	2.75@3.00	2.75@3.00	2.75@3.00	2.75@3.00	3.00@3.25	3.00@3.25	3.00@3.25	3.00@3.25
Florida high grade phosphate rock, 77%, f. o. b. Florida ports	5.00@5.25	5.00@5.25	5.00@5.25	5.00@5.25	5.00@5.25	5.00@5.25	5.75@6.25	5.75@6.25	5.75@6.25	5.75@6.25
Tennessee phosphate rock, f. o. b. Mt. Pleasant, domestic, 78@80%, ton	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50
75%, guaranteed	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00	4.75@5.00
68@72%	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50

POTASHES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Muriate of potash, 80@85%, basis 80%, in bags, ton	450.00@460.00	400.00@420.00	290.00@350.00	415.00@420.00	475.00@500.00	245.00@250.00	250.00@275.00	160.00@—	39.57@—	39.07@—
Muriate of potash, min. 95%, basis 80%, in bags, ton	375.00@—	375.00@—	300.00@310.00	nominal	nominal	nominal	nominal	160.00@—	41.25@—	40.75@—
Muriate of potash, min. 98%, basis 80%, in bags, ton	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	160.00@—	42.15@—	41.65@—
Sulphate of potash, 90@96%, basis 80%, in bags, ton	275.00@300.00	275.00@300.00	275.00@300.00	325.00@350.00	440.00@—	205.00@210.00	205.00@210.00	140.00@—	48.07@—	47.57@—
Double manure salt, 48@53%, basis 48%, in bags, ton	105.00@—	105.00@—	105.00@—	105.00@—	105.00@—	105.00@—	105.00@—	57.00@—	25.54@—	25.04@—
Manure salt, min. 20%, K_2O, in bulk, ton	50.00@60.00	50.00@60.00	50.00@60.00	50.00@60.00	60.00@—	60.00@—	60.00@—	29.00@—	13.78@—	13.58@—
Hardsalt, min. 16%, K_2O, in bulk, ton	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	—@—	11.07@—	10.87@—
Kainit, min. 12.4%, K_2O, in bulk, ton	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	40.00@50.00	—@—	8.56@—	8.36@—

Quality Paint and Varnish Removers

Brand	Manufacturer
"AB-LU-ENT"	Detroit White Lead Works, Detroit, Mich.
"ACME"	Acme White Lead & Color Works, Detroit, Mich.
"AD-EL-ITE"	Adams & Elting Co., Chicago, Ill.
"ALBANY"	Albany Chemical Co., Albany, N. Y.
"APEX"	Berry Bros., Detroit, Mich.
"ATLANTIC"	Atlantic Varnish Works, Inc., Richmond, Va.
"BALL'S"	Ball Chemical Co., Pittsburgh, Pa.
"BEAVER CREAM,"	F. W. Devoe & C. T. Raynolds Co., New York, N. Y.
"BLITZ"	Eugene Arnstein, Inc., Chicago, Ill.
"BOSTON"	Boston Varnish Co., Boston, Mass.
"B. P. S."	Patterson-Sargent Co., Cleveland, Ohio
"BRIDGEPORT STANDARD,"	Bridgeport Wood Finishing Co., New Milford, Conn.
"BUNKER HILL,"	Burbank & Ryder Varnish Co., Boston, Mass.
"CAUTERIA"	Devoe & Raynolds Co., Chicago, Ill.
"CHI-NAMEL"	Ohio Varnish Co., Cleveland, Ohio
"CLEAN CUTTER"	Warren Paint Co., Warren, Ohio
"CLEANOFF"	Campbell Glass & Paint Co., St. Louis, Mo.
"CLIMAX"	Climax Mfg. Co., Philadelphia, Pa.
"CONQUEROR"	W. P. Fuller & Co., San Francisco, Cal.
"CROWN"	Bradley & Vrooman Co., Chicago, Ill.
"CUT-ALL"	C. R. Cook Paint Co., Kansas City, Mo.
"DE RONDE"	Frank S. De Ronde, New York, N. Y.
"DEVOE"	F. W. Devoe & C. T. Raynolds Co., New York, N. Y.
"ELECTRIC SOLVO"	S. C. Johnson & Son, Racine, Wis.
"ELECTRO"	Electro Mfg. Co., Detroit, Mich.
"EUREKA"	Palmer-Price Co., Newark, N. J.
"EXCELSIOR"	Excelsior Varnish Works, Cleveland, Ohio
"EXPEDITE"	Pratt & Lambert, Inc., Buffalo, N. Y.
"FAULTLESS"	George E. Watson Co., Chicago, Ill.
"FOREST CITY"	Forest City Paint & Varnish Co., Cleveland, Ohio
"GLIDDEN'S"	Glidden Varnish Co., Cleveland, Ohio
"HARDY"	Hardy Paint & Varnish Co., Toledo, Ohio
"HARRISON'S	Harrison Bros. & Co., Inc., Philadelphia, Pa.
"HILO"	Moller & Schumann Co., Brooklyn, N. Y.
"IDEAL"	Ideal Mfg. Co., Newark, N. J.
"INSTINT"	Perry-Austen Mfg. Co. Grasmere (Rosebank P. O.), Staten Island, N. Y.
"JEWEL"	Wadsworth-Howland Co., Chicago, Ill.
"KLEAN-ITT"	W. W. Lawrence & Co., Pittsburgh, Pa.
"KLEANSA"	Standard Varnish Works, New York, N. Y.
"KUM-OFF"	Twin City Varnish Co., St. Paul, Minn.
"KUT-KOTE"	F. W. Thurston Co., Chicago, Ill.
"LA SALLE"	La Salle Varnish Co., Chicago, Ill.
"LINGERWETT"	Wilson Remover Co., Newark, N. J.
"MAGIC"	Chicago White Lead & Oil Co., Chicago, Ill.
"MAGIC"	Wadsworth, Howland & Co.,Inc., Boston, Mass.
"MAGIC SOLVENT"	McPhee & McGinnity Co., Denver, Col.
"MASTER"	O'Brien Varnish Co., South Bend, Ind.
"MEMPHI"	De Soto Paint Mfg. Co., Memphis, Tenn.
"MIRAC"	John Lucas & Co., Inc., Philadelphia, Pa.
"MISTIC"	J. A. & W. Bird & Co., Boston, Mass.
"MONARCH BULL DOG,"	Chas. H. Gillespie & Sons, Jersey City, N. J.
"MONGOL-RAPID"	Baer Bros., New York, N. Y.
"NEW ERA"	New Era Remover Co., Newark, N. J.
"NOXALL"	Enterprise Paint Mfg. Co., Chicago, Ill.
"PARROTT'S"	Parrott Varnish Co., Bridgeport, Conn.
"PATEKOTE"	Patek Brothers, Milwaukee, Wis.
"PATTON'S"	Patton Paint Co., Milwaukee, Wis.
"PEERLESS"	Brooklyn Varnish Mfg. Co., Brooklyn, N. Y.
"PENINSULAR,"	Peninsular Paint & Varnish Co., Ltd., Detroit, Mich.
"PHENOID"	Chalmers Chemical Co., Newark, N. J.
"PITCAIRN"	Pitcairn Varnish Co., Milwaukee, Wis.
"RAPID"	Indianapolis Paint & Color Co., Indianapolis, Ind.
"RE-MOO-VIT"	Flint Varnish & Color Works, Flint, Mich.
"ROYALITE"	National Varnish Co., Long Island City, N. Y.
"SAFETY FIRST"	New Era Remover Co., Newark, N. J.
"SHUR-OFF"	Ullman-Philpott Co., Cleveland, Ohio
"SIMPLEX"	St. Louis Surfacer & Paint Co., St. Louis, Mo.
"23 SKIDDOO"	Keystone Varnish Co., Brooklyn, N. Y.
"SLIKUP"	N. B. Arnold, Blooklyn, N. Y.
"SUPREMEO"	Sailors & Platt Co., Cleveland, Ohio
"TAKITOF"	Atlantic Drier & Varnish Co., Philadelphia, Pa.
"TAXITE"	Sherwin-Williams Co., Cleveland, Ohio
"TIP-TOP"	Payson Varnish Co., New York, N. Y.
"TYRANT"	August P. Fuller Co., Portland, Maine
"VAR-NI-GO"	A. S. Boyle Co., Cincinnati, Ohio
"VARN-ERACE"	Dozier & Gay Paint Co., Jacksonville, Fla.
"VELOX"	Continental Varnish Co., Newark, N. J.
"V. & P. SOLVENT"	Eberson-Lindsley Paint Co., St. Louis, Mo.
"WILHELM"	A. Wilhelm Co., Reading, Pa.
"WIZARD"	Heath & Milligan Mfg. Co., Chicago, Ill.
"WONDERPASTE"	Wilson Remover Co., Newark, N. J.
"X-CELL-ALL"	Charles McAdam Co., Chicago, Ill.
"Y. B."	Yarnall Paint Co., Philadelphia, Pa.
"ZIP"	James H. Prince Paint Co., Boston, Mass.
"ZYMOLITE"	Emil Calman & Co., Henry L. Calman, Prop., New York, N. Y.

PYRITES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Spanish crude, unwashed fines, unit, averaging 48@52% of sulphur, ex ship	16@16½	16@16½	15@15¼	15@15¼	15@15½	10¼@11	10¼@11	10¼@11	10¼@11	10¼@11
Spanish smalls, washed, fines	16@16½	16@16½	15@15¾	15@15¾	15@15½	10¼@11	10½@11	10¼@11	10¼@11	10¼@11
Furnace size lump ore, washed, averaging 48@52% of sulphur	—@15½	—@15½	—@15¼	—@15¼	—@15¼	—@13	—@13	—@13	—@13	—@13
Spanish lump, washed	—@15½	—@15½	—@15¼	—@15¼	—@15½	—@13	—@13	—@13	—@13	—@13
Furnace size, high-grade, practically non-arsenical, less than ⅛% arsenic	16@—	16@—	16@—	16@—	16@—	13@13¾	13@13¾	13@13¾	13@13¾	13@13¾
Domestic concentrates, f. o. b. mill	11@12	11@12	11@12	11@12	11@12	7@9¼	7@9¼	7@9¼	7@9¼	7@9¼

THE OIL MARKETS.

ANIMAL AND FISH OILS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Cod, Newfoundland, gal	*80@82	70@72	60@61	62@64	63@65	45¼@47½	50@52	45@46	36@38	36½@37½
domestic, prime	76@78	67@69	*59@60	60@62	61@62	43@44	47@48	41@42	33@34	32@34
Degras, French, lb	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	3¼@3¾
English	7@7¼	6½@6¾	7@7½	7½@8¼	6¾@7¼	6¼@7	6¼@6¾	7@8	4¾@5	3¾@3¾
German	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	3@3½
American	6¾@7	6¼@6½	6¾@7¼	7@7½	6@6¼	6¼@7	6¼@6¾	—@—	4@4½	2¾@3¼
neutral	*32@42	*40@80	1.05@1.10	*1.20@1.30	*1.10@1.20	10@15	9@13	—@—	—@—	2¾@3¼
Herring, f. o. b. factory, gal	—@—	—@—	—@—	—@—	—@—	—@—	—@—	nominal	nominal	nominal
Horse	10¾@11¼	10@10¼	10@10½	9¾@10¼	9@9½	6¼@7	6¼@7	6¼@7	6¼@6¾	6¼@7
Lard, prime winter, gal	1.30@1.40	1.08@1.16	1.05@1.10	95@97	94@98	84@88	88@90	90@92	90@92	92@93
off prime	1.10@1.15	96@98	96@98	88@90	78@84	65@68	65@68	67@71	68@72	66@68
extra No. 1	98@1.02	87@92	92@94	82@86	70@75	61@63	61@63	62@63	62@64	62@63
No. 1	94@96	82@86	85@87	78@80	60@64	54@56	54@56	54@56	53@56	53@55
No. 2	87@90	76@80	81@83	70@78	56@59	51@53	52@53	52@53	51@53	51@52
Menhaden, Northern, crude	—@—	—@—	*50@—	—@—	—@—	nominal	35@—	33@—	35@—	nominal
Southern, f. o. b. factory	Nom. 70	50@—	48@—	—@—	40@47	38@—	33@—	35@—	35@—	32½@—
brown, strained	77@78	58@60	54@58	54@56	48@49	40@41	39@40	40@41	37@38	37@38
light, strained	79@80	60@62	58@60	56@58	50@51	42@43	40@41	42@43	38@39	38@39
yellow, bleached	81@82	62@64	60@62	58@60	52@53	44@45	42@43	44@45	41@42	41@42
white, bleached, winter	83@84	64@66	62@64	60@62	54@55	45@46	44@45	46@47	43@45	43@44
Neatsfoot, 20 deg	1.20@1.30	1.05@1.10	1.05@1.10	98@99	95@97	92@94	93@94	93@94	96@98	96@98
30 deg., cold test	1.15@1.20	1.00@1.05	1.00@1.05	94@98	90@92	86@88	86@88	86@88	88@90	88@90
40 deg., cold test	1.10@1.15	95@1.00	95@1.00	86@90	84@86	80@82	80@82	80@82	82@84	82@84
prime	1.00@1.05	90@95	90@95	82@84	68@72	62@64	62@64	62@64	64@65	64@65
dark	90@95	80@84	84@86	76@78	63@66	56@58	56@58	56@58	58@61	58@61
Oleo oil, lb	15@19	12@13	10¼@13	9½@13	8@12	8@12	8@12	7¼@13	7¼@13	8@9¾
Porpoise, body	*65@70	*50@55	*45@50	*45@50	45@50	40@45	40@45	40@45	40@46	40@45
jaw	*24.00@26.00	22.00@24.00	*20.00@—	*20.00@—	20.00@—	18.00@20.00	18.00@20.00	18.00@20.00	18.00@22.00	18.00@20.00
Red elaine, lb	9¼@10	8¼@8¾	8¼@8¾	8@8½	5¼@6	5¼@5½	5¼@6½	5¼@6	6¼@6¾	6¼@6¼
Red, saponified	9@10	8¾@9	8¼@8¾	8½@9¾	6¼@6¾	6¼@6	5¼@6	6¼@7	6¼@7	6¼@7
Stearic acid, single pressed	9@10	8¾@9	9@9¾	8½@9¾	6¼@6¾	11@11½	11@11½	10½@10¾	9@11	8¾@10¼
double pressed	12¼@14	12@12½	12½@13	13@13½	12@12½	12¼@13	12@12½	11@11¼	—@—	—@—
triple pressed	14¾@15	13@13½	13½@14	14@14¼	14@15	13¼@14	13@13¾	—@—	—@—	—@—
Sod oil	15¾@16¼	14@14½	14½@15	15@15½	15@16	5½@6	5¼@5¾	42@46	40@45	34@35
Sperm, bleached, winter, 38 deg. cold test, gal.	9@9½	7@8	7¼@7¾	7¾@8¼	7@7¼	70@—	70@—	70@—	70@—	70@—
45 deg., cold test	1.03@1.05	80@82	80@82	76@77	74@75	68@—	68@—	68@—	68@—	68@—
natural winter, 38 deg. cold test	98@1.00	78@80	78@80	74@75	72@73	67@—	67@—	67@—	67@—	67@—
45 deg. cold test	1.00@1.02	76@78	76@78	73@74	71@72	65@—	65@—	65@—	65@—	65@—
Seal, white	92@1.00	74@76	74@76	71@72	69@70	55@60	52@56	48@52	48@52	45@47
Tallow, acidless	—@—	*70@72	*70@72	*65@70	62@64	62@63	62@63	62@63	62@63	64@65
prime	1.04@1.06	90@92	90@94	84@86	78@80	60@61	60@61	60@61	60@61	62@63
Whale, natural winter	1.04@1.05	88@90	88@90	82@83	75@77	48@49	48@49	48@—	48@—	48@—
bleached	77@78	64@66	62@63	58@59	54@55	50@51	50@51	50@—	50@—	50@—
extra bleached, winter	79@80	66@68	64@65	60@61	56@57	52@53	52@53	52@—	52@—	52@—
	81@82	68@70	66@67	62@63	58@59					

* Nominal.

VEGETABLE OILS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Linseed, raw, car lots, gal	92@—	76@—	63@—	76@—	66@—	55@—	54@—	58@—	48@—	59@—
5-barrel lots	93@—	77@—	64@—	77@—	67@—	56@—	55@—	59@—	49@—	60@—
boiled, car lots	93@—	77@—	64@—	77@—	67@—	56@—	55@—	59@—	50@—	60@—
boiled, 5-barrel lots	94@—	78@—	65@—	78@—	68@—	57@—	56@—	60@—	51@—	61@—
double boiled, car lots	94@—	79@—	66@—	79@—	69@—	57@—	56@—	60@—	51@—	61@—
double boiled, 5-barrel lots	95@—	80@—	67@—	80@—	69@—	58@—	57@—	61@—	52@—	62@—
refined, car lots	95@—	80@—	67@—	80@—	70@—	58@—	57@—	61@—	53@—	62@—
refined, 5-barrel lots	96@1.00	81@82	68@71	79@84	70@74	60@64	59@64	62@67	51@57	63@65
varnish oil, as to grade	89@90	74@—	69@70	74@—	65@—	58@60	58@—	58@—	45@—	58½@—
f. o. b. Minneapolis, cars	68½@69	69@70	71½@73	—@55	8.50@8.60	44@45	38½@39	41@42	36½@37	41@42
Cottonseed, crude, f. o. b. mills	11.95@—	10¼@10¾	10¼@—	8½@—	8¾@—	6.91@7.20	6¼@6¼	6¼@6½	5¾@6	6¼@6¾
yellow, summer, prime	—@—	—@—	11@11½	10½@11½	8¾@—	—@—	6¼@6¾	7@7½	6@7	7@7¼
white, summer	—@—	—@—	11@11½	10½@11½	8¾@—	—@—	6¼@6¾	7@7½	6@7	7@7¼
yellow, winter	1.05@1.10	96@98	86@90	95@97	92@94	85@89	86@88	90@95	95@1.10	78@82
Olive, denatured, gal	10@10¼	9½@9¾	10@10½	13½@14¼	9½@10	8¾@8¾	8¼@8¾	11¼@12	5½@10	7@7¼
foots	12@12½	9½@9¾	*11@12	20@22	9½@9½	6¾@7¼	7@7¼	11¼@11½	7¼@7¼	6¾@7
Palm, Lagos, spot	11¼@11¾	9@9¼	*10@11	15@16	8¾@9	6¾@7¼	6¾@7	10¾@11¼	6¾@7	6¼@6¾
commercial, spot	12@12½	9¼@9½	*10@11	17@18	8¾@9	6¾@7	6¾@7	10@12½	6¾@7	6¾@6¾
prime, red, spot	14½@14¾	13@13½	14@15	16@16½	11¾@12	8¾@9	9@10	12@12½	12@—	8¾@9
Palm kernel	17@18	14@15	15@16	17@18	15@15½	10¼@11	10¼@10¾	13¼@14¼	13@—	10¼@11½
Cocoanut, Cochin, spot	14¼@15	13¼@14	*14¼@15	16@16½	13@13½	9@9¼	8¾@8¾	11@11½	11@11½	9@9¼
Ceylon	13¾@14	12¼@12¾	*14¼@15	—@—	—@—	—@—	—@—	—@—	—@—	6.35@6.40
domestic	*12.25@12.50	*10.00@—	8.41@8.51	*10.25@10.50	7.85@7.90	6.45@6.55	5.80@5.91	6.26@6.41	5.70@5.75	nominal
Corn oil, crude, in barrels	13.01@13.06	10.61@10.66	10.41@10.46	*11.11@11.16	8.45@8.50	7.15@7.20	6.35@6.40	7.25@7.30	—@—	6¼@—
refined, in barrels	—@—	—@—	9¾@—	9¾@9¾	7¾@—	6¼@6¼	6¼@6¼	6¾@6½	5¼@5½	6¼@—
Soya bean, English, spot, barrels	12@12¼	9@—	7¾@8	9¾@9¾	7¾@—	6¼@6¼	6¼@6¼	6¾@6½	5¼@5½	6¼@—
Manchuria, spot, barrels	*1.25@1.35	*1.15@1.25	*1.10@1.20	1.10@1.15	1.00@1.10	78@84	75@82	75@85	75@80	60@68
Sesame, gallons	*1.30@1.40	*1.20@1.30	*1.10@1.20	1.10@1.15	95@1.00	82@86	80@85	75@80	75@80	75@78
Mustard	85@86	72@74	75@80	75@80	66@72	65@70	65@70	65@70	70@75	62@68
Peanut, soap, spot	95@1.00	88@96	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
edible	*1.70@1.85	*1.70@1.85	1.45@1.50	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Poppy seed	12¾@13	11@12	10@12½	14@—	9@9½	6¾@6¾	6½@7¼	6¾@7	6¼@7	6¼@6¾
China wood, oil	—@—	—@—	—@—	—@—	—@55	—@56	36@38	34@36	34@36	34@38
Pine oil, white, steam	60@—	60@62½	52@60	50@60	50@60	—@50	34@36	30@33	30@33	32@35
yellow, steam	34@36	35@40	30@31	30@31	30@31	80@81	30@31	30@31	30@31	30@31
Tar oil, gen. dist	21½@—	21½@—	—@20	—@20	20@22	20@22	20@22	18@20	18@20	18@20	18@20
commercial	—@38	—@38	—@30	—@30	—@32	—@25	—@25	—@25	—@25	—@27
Rosin oil, 1st rectified	—@48	—@48	—@40	—@40	—@43	—@36	—@36	—@36	—@36	—@38
2d rectified	—@60	—@60	—@50	—@50	—@52	—@45	—@45	—@45	—@45	—@48
3d rectified	—@70	—@70	—@60	—@60	*—@62	—@55	—@55	—@55	—@55	—@60
4th rectified	—@—	—@—	—@—	—@—	1.05@1.07	96@98	95@1.00	87@89	74@76	74@75
Rape seed, in barrels, refined, French	1.15@1.17	96@98	*1.00@1.05	*1.10@1.15	99@1.00	81@83	80@81	85@87	71@73	63@—
blown	1.10@1.12	92@94	*95@1.00	*1.05@1.10	96@97	77@79	76@77			56@—
refined English										

* Nominal.

OIL CAKE AND MEAL.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Linseed, cakes, domestic, per short ton	46.00@—	36.00@37.00	32.50@—	30.00@32.00	37.50@39.00	37.00@38.00	32.00@33.00	30.00@—	35.50@36.50	30.00@32.00
meal	47.00@—	38.00@—	33.50@—	35.00@36.00	39.00@40.00	37.00@—	33.00@—	31.00@—	36.00@—	33.50@—
Cottonseed cake, f. o. b. mills, Texas	41.00@—	32.25@—	—@—	—@—	28.50@29.50	—@—	—@—	23.50@24.75	24.50@25.50	—@—
f. o. b. New Orleans	—@—	27.75@—	—@—	—@—	—@29.00	25.00@27.00	—@24.00	—@—	19.75@—	—@—
Cottonseed meal, f. o. b. Atlanta	35.00@36.00	32.50@—	27.00@—	30.00@31.00	33.00@34.00	28.00@29.00	23.00@23.50	24.50@25.00	21.00@21.50	—@—
f. o. b. Montgomery	—@39.00	—@—	—@—	—@—	33.00@—	26.00@—	—@—	—@—	21.00@22.00	—@—
f. o. b. New Orleans	37.50@40.00	31.00@32.50	—@—	31.00@32.00	33.50@34.50	28.50@29.50	26.50@27.00	27.25@28.25	23.75@24.75	28.00@29.00
Corn cake, per short ton	37.00@41.00	28.50@—	28.50@—	28.50@—	28.50@—	28.50@—	22.00@24.00	30.00@31.00	28.00@29.00	—@—
meal	41.00@42.00	30.60@—	30.60@—	30.60@—	30.60@—	30.60@—	24.00@26.00	31.00@32.00	—@—	

LARD, TALLOW, STEARINES AND GREASES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Candles, adamantine, p. s., 16 oz	10¼@11	10¼@11	10¼@11	10¼@11	10¼@11	10¼@11	10½@11	10¼@11	10¼@11	10¼@11
14 oz	7¼@8½	7¼@8½	7¼@8½	7¼@8½	7¼@8½	7¼@8½	7¼@8½	7¼@7½	7¼@8½	7¼@8½
paraffin, 4s, 6s, and 12s	9@10	9@10	9@10	9@10	9@10	9@10	9@10	9@10	9@10	9@10
Candles, patent sperm, 4s and 6s	38@40	38@40	38@40	38@40	38@40	38@40	38@40	38@40	38@40	38@40
sperm, 4s, 6s	33@34	33@34	33@34	33@34	33@34	33@34	33@34	33@34	33@34	33@34
stearic acid, plain, 4s, 6s and 8s	16@—	16@—	12@—	12@—	12@—	12@—	12@—	12@—	12@—	12@—
patent ends, 4s and 6s	16¼@—	16¼@—	12¼@—	12¼@—	12½@—	12½@—	12½@—	12½@—	12½@—	12½@—
cartons, 6 lbs., each	16¼@—	16¼@—	12¼@—	12¼@—	12½@—	12½@—	12½@—	12½@—	12½@—	12½@—
Lard, Middle West	16.00@16.10	14.90@15.60	13.30@13.40	11.40@11.50	9.90@10.00	8.50@8.60	8.80@8.90	9.60@9.70	10.875@—	10.375@—
city steam	15¾@15¾	14¼@—	13¼@—	11¼@11¾	9¾@9¾	8¾@8¾	8¾@8¾	9¾@9½	10¼@—	9¾@9¾
compound	14½@14¾	12¼@12½	11¾@12¼	11¼@11¾	@10¼	8¼@8¾	7¾@7¾	7¾@8¼	7¾@7¾	8¾@8¾
Stearine, lard	17¼@17¾	15¾@—	—@14	—@12½	—@11	—@9¾	—@10¼	11¼@11¾	11¼@11¾	11¼@11¾
oleo	14¼@—	13¼@14¼	11@—	—@11½	—@9¾	—@9¾	—@9¾	—@8¾	—@10	—@8
Tallow, special, loose	11¾@—	10¼@—	9@¾	—@10	—@8¾	—@8¾	—@10¼	—@8¾	—@9¾	—@6¼
Neutral lard	18¾@—	15¾@—	10@—	14@—	13¾@14¼	13¾@14¼	13¾@14¼	13¾@14¼	13¾@14¼	—@—
Grease, white	11@12½	8¾@9¼	9@10	9@9½	7¾@8¼	7¾@8¼	7¾@8¼	7¾@8¼	7¾@8¼	10¼@10¾
yellow	10@10½	8¼@8¾	8¼@9	8¾@9	6½@7¼	6¾@7¼	6¾@7¼	6¾@7¼	6¾@7¼	6¾@7¼
house	9½@10	8¼@8¾	8¼@9	8¾@9	6¼@6¾	5¾@6¼	5¾@6¼	5¾@6½	5¾@6½	5¾@6¼
brown	10@10½	8¼@8¾	8¼@9¼	8¾@9	6@6¼	5¾@6¼	5¾@6¼	5¾@6¼	5¾@6¼	5¾@6¼
yellow grease, stearine	9½@10	7¼@8	7¼@8	7¾@8	5¾@6	4¾@5¾	4½@5½	5¾@6	5¾@6	4¾@5¾
white grease, stearine	11¼@12½	8¾@9¼	8¼@9¼	8½@9¼	6¼@6¾	5¼@5¾	5¼@5¼	5¾@6	5¾@6	5¾@6¼
		9@10	9@10	8¾@9¼	7¾@8¼	6¼@6¾	6@6¼	6@6¼	6@—	

Spot QUALITY FIRST Contract

PHENOL U. S. P.

Acetanilid
Acetphenetidin
Benzoic Acid
Benzoate Soda
Hydroquinone
Benzol
Toluol
Solvent Naphtha
Naphthalene
Creosote Oil

PEROLIN BLACK

Metol
Manganese Borate
Manganese Dioxide
Manganese Resinate
Manganese Sulphate
Cresylic Acid
Carbon Bisulphide
Xylol
Sulphur Precipitate
Sulphate of Ammonia

HIGH PERCENTAGE ZINC DUST FINEST MESH

Capitol Chemical Company

2 Rector Street, New York

Phone 1675 Rector Cable "Rycard"

LUBRICATING OILS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Black reduced, 29 grav., 25@30 cold test, per gal.	13½@14	13½@14	13¼@14	12½@13	12½@13	12½@13	12½@13	12½@13	12½@13	13½@14
29 grav., 15 cold test	14@15	14@15	14@15	13@14	13@14	13@14	13@14	13@14	13@14	14@14½
summer	13@14	13@14	13@14	12@13	12@13	12@13	12@13	12@13	12@13	13@13½
Cylinder, light filtered	21@26	21@26	21@26	20@25	20@25	20@25	20@25	20@25	20@25	21½@33
dark, filtered	18@19	18@19	18@19	19@20	17@18	17@18	17@18	17@18	17@18	18@26
extra cold test	26@31	26@31	26@31	26@30	25@30	25@30	25@30	25@30	25@30	27@34
dark steam, refined	15@19	15@19	15@19	14@16	14@16	14@16	14@16	14@16	14@16	14½@25
Neutral, West Virginia, 29 grav	26½@27	26½@27	26½@27	25@26	24½@25	23@24	22@22½	22@22½	22@22½	23@23½
filtered lemon, 37½@38 grav	21½@22	21½@22	21½@22	—@—	35½@36	34@35	33@34	33@34	33@34	—@—
white, 30@31 grav	33@34	33@34	33@34	33@34	—@—	—@—	—@—	—@—	—@—	—@—
32@34 grav., bloomless	21½@22	21½@22	21¼@22	15@16	19½@20	18@19	17@18	17@18	17@18	18@19
31 grav., wool grade	19½@20	19½@20	19¼@20	15@16	17½@18	16@17	15@16	15@16	15@16	16@16½
Paraffine, high viscosity	29½@30	29½@30	29¼@30	26@28	24½@25	23@24	22@23	22@23	22@23	27@28
903 spec. grav	21½@22	21½@22	21½@22	17@18	16½@17	15@16	14@14½	14@14½	14@14½	15@15½
865 spec. grav	18½@19	18½@19	18½@19	12@13	13½@14	12@12½	11@11½	11@11½	11@11½	12½@13
Red paraffine	18@19	18@19	18@19	14@18	13@14	13@14	12½@14	12½@14	14@15	15@16
Spindle, No. 200	24@25	24@25	24@25	18@19	19½@20	18@19	17@18	17@18	17@18	18@19
No. 160	23½@24	23½@24	23½@24	16@17	18½@19	18@—	16@17	16@17	16@17	17@18
No. 110	23@23½	23@23½	23@23½	15½@16	18@18½	17@—	15@16	15@15	15@16	16@17
No. 80	21@22	21@22	28@35	—@—	16@17	15@—	13@14	13@14	13@14	14@15
filtered	28@35	28@35	21@22	13@14	23@24	22@—	20@21	20@21	20@21	21@23

PAINTS.

LEAD, ZINC AND PIGMENTS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Pig lead	7½@—	7@—	6.90@7	7¾@8¼	5.40@—	4.50@—	6¾@—	4.40@—	3.80@—	3.90@—
White lead, basic carbonate, American, dry, lb.	8¾@—	8¾@—	8¾@—	8¾@—	6¼@—	5¾@—	6¾@—	5¼@5½	5@5¼	5¼@5¾
in oil (100 lb. pkgs. or over)	9¾@—	9¾@—	9¾@—	9¾@—	7¼@—	6¾@—	7¾@—	6¾@7	6¾@7	6¾@7
English, in oil	12@—	12@—	12@—	12@—	12@—	12@—	12@—	12@—	10¼@—	10¼@—
basic sulphate	8¼@—	8¾@—	8¾@—	8¾@—	6@—	5½@—	6¼@—	5@5¼	4¾@5	5@5¼
Litharge, American, powdered	9¼@—	9¼@—	9¼@—	9¼@—	6½@—	6@—	7@—	5¼@5¾	5@5¼	5¼@5¾
English glassmakers'	10@11	10@11	10@11	10@11	10@11	10@11	10@11	10@11	9¼@9¾	9¼@9¾
Lithopone	6¼@6½	8½@10	14½@15½	14½@15½	6¾@7	5¼@6¼	5¾@6	4¼@4½	3¾@4½	3¾@4½
Red lead, American	9¾@—	9¾@—	9¾@—	9¾@—	7¼@—	6¼@—	7½@—	6@6½	5½@6	6@6¼
in oil	10¼@—	10¼@—	10¾@—	10¾@—	8@—	7¼@7½	—@—	—@—	—@—	—@—
foreign	12@14	12@14	12@14	12@14	9@10	9@10	9@10	9@10	8½@9	8½@9
English glassmakers'	12@14	12@14	12@14	12@14	9@10	9@10	9@10	9@10	8½@9	8½@9
Orange mineral, American	12@12½	12@12½	12@12½	12@12½	9@—	8¾@—	9¾@—	7¼@8¼	7¼@8¼	7½@8¼
English	—@—	—@—	—@—	—@—	10@13	10@13	10@13	10@13	10@13	10@13
French	16@18	16@18	16@18	16@18	15@16	15@16	15@16	12¾@13	12¾@13	12¾@13
German	12@*13	12@*13	*12@13	*12@13	12@13	12@13	12@13	12@13	12@13	12@13
Flake, white	9¾@—	9¾@—	9½@12	9½@12	8@10½	8@10½	8@10½	8@10½	8@10½	8@10¼
Spelter	10@—	9¼@—	12@—	17.85@—	17.00@17.20	14@14¼	22@—	9.62½@—	5.70@5.80	5.00@5.10
Zinc oxide, white—										
German (French process) red seal	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	6¾@—
green seal	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	7¾@—
white seal	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	8¾@—
French, red seal	16@18	16@18	16@18	25@26½	nominal	nominal	nominal	nominal	nominal	8¾@—
green seal	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	10¾@—
American process	9¾@9¾	9¾@9¾	9¾@9¾	8¾@8¾	8¾@8¾	7¾@8¼	7¾@8¼	5¾@—	5¾@—	5¾@—
French process, red seal	17½@17¾	16@16¼	16@16¼	24@24¼	16@—	30@—	25@—	10¼@—	7@—	6¾@—
green seal	18@18¼	16¼@16¾	16¼@16¾	24½@24¾	16¼@—	30½@—	25½@—	10¾@—	7½@—	7@—
white seal	18½@18¾	17@17¼	17@17¼	25@25¼	17@—	31@—	26@—	11¼@—	8@—	7½@—
Barytes, prime white, foreign, per ton	38.00@40.00	38.00@40.00	40.00@—	24.00@26.00	19.00@23.00	19.00@23.00	19.00@23.00	19.00@22.00	19.00@23.00	19.00@23.00
domestic, prime white or floated, f. o. b. works	25.00@35.00	25.00@35.00	30.00@38.00	18.00@21.00	16.00@20.00	16.00@20.00	16.25@17.00	17.00@18.00	17.00@18.00	17.00@18.00
off color, f. o. b. works	22.00@24.00	22.00@24.00	25.00@28.00	15.00@16.00	12.50@14.00	12.50@14.00	12.50@14.00	13.00@15.00	13.00@15.00	13.00@15.00
Blanc fixe, bulk, original casks, 1,000 lbs. each, per ton	80.00@85.00	120.00@—	120.00@—	70.00@—	45.00@—	45.00@—	45.00@—	40.00@43.00	40.00@43.00	40.00@43.00
dry (in bbls. of 600 lbs.)	5½@—	4½@—	6@7	4@—	4@—	3@3¼	3@3¼	3¼@4	3¼@4	3¼@4

* Nominal.

DRY COLORS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
BLACK—										
Bone, lb	4@8	4@8	4@8	3½@7	2½@5	2½@5	2½@5	2½@5	2½@5	2½@5
Drop	7@12	7@12	7@12	6@12	5@8	5@8	5@8	5@8	5@8	5@8
Ivory	16@30	16@30	16@30	10@24	8@12	8@12	8@12	8@12	8@12	8@12
Carbon gas	14@20	14@20	14@20	*10@12	5½@6½	5½@6¾	5½@6¾	4@6	4@6	3½@6
Lampblack	12@18	12@18	12@18	*14@18	5½@15	4@8	4@8	3@7	3@7	3@7
Mineral blacks, ton	20@30	20@30	20.00@30.00	18.25	18@25	18@25	18@25	18@25	18@25	18@25
BLUES—										
Celestial, lb	20@30	20@30	20@30	22@25	18@20	18@20	18@20	nominal	nominal	4@6
Chinese	1.50@1.80	1.50@1.80	1.80@2.50	2.00@2.25	nominal	nominal	nominal	nominal	nominal	28@30
Italian	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	16@22
Milori	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	28@30
Prussian	1.00@1.75	1.30@1.80	1.80@2.25	2.00@2.25	1.50@—	1.10@1.15	95@1.05	46@48	46@48	26@28
Prussian, foreign	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	32@36
Soluble	1.50@2.00	1.50@2.00	1.80@2.25	2.25@—	1.50@—	1.15@1.25	85@90	50@55	50@55	27@29
Ultramarine	20@40	17@40	10@40	7@30	5@22	4@22	4@22	3½@13	3½@13	3½@13
BROWNS—										
Sienna, Italian, burnt and powdered, lb	5½@8	6@8	6@8	5@7	5@7	5@7	5@7	4@7	4@5	4@7
burnt, lump	4@6	4@6	4@6	3¼@6	3¼@8	3¼@6	3¼@6	3¼@6	3¼@6	3¼@6
raw, powdered	4@6	4@6	4@6	5@8	5@8	5@8	5@8	4@7	4@7	4@7
raw, lump	4@6	4@6	4@6	4@6	4@6	4@6	4@6	3@5	3@5	3@6
American, burnt and powdered	2@3	2@3	2@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3
raw	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3
Spanish brown, ton	16.00@20.00	16.00@20.00	16.00@20.00	10.00@20.00	10.00@20.00	10.00@20.00	10.00@20.00	10.00@20.00	10.00@20.00	10.00@20.00
Umber, Turkey, burnt and powdered	4@5	4@5	4@5	3@4	3¼@5	3@4	3@4	3¼@5	3@3½	3@3½
burnt, lumps, selected	4½@6	4½@6	4½@6	3½@5	3½@5	3½@5	3½@5	3@4½	3@4½	3@4½
raw and powdered	3@3½	3@3½	3@3½	3@3½	3@3½	3@3½	3@3½	2½@3	2½@3	2½@3
raw, lumps	3½@5	3½@5	3½@5	2½@3½	3½@5	3½@5	3½@5	3@4½	3@4½	3@4½
American burnt	2@2½	2@2½	2@2½	2@2½	2@2½	2@2½	2@2½	2@2½	2@2½	2@2½
raw	2@2½	2@2½	2@2½	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3	2¼@3
Vandyke brown	*10@—	*10@—	*10@—	*10@—	3@4	3@4	3@4	2½@3	2½@3	2½@3
soluble	*10@—	*10@—	*10@—	*10@—	3¼@4	3¼@4	3¼@4	2¾@3¼	2¾@3¼	2¾@3¼
GREENS—										
Chrome, chemically pure, lb	40@65	40@65	55@75	80@85	30@40	23@32	20@30	22@30	22@30	17@25
grinders'	16@20	16@20	23@28	23@28	16@—	12@—	8@12	6@10	6@10	6@10
jobbing	13@15	13@15	18@23	20@25	10@—	8@10	6@8	4½@5½	4½@5½	4½@5¼
common	9@13	9@13	13@18	18@20	7@9	5@7	5@7	3½@5	3½@5	3½@5
Paris, in bulk, arsenic, kegs	23@24	27@—	32@—	nominal	nominal	13@14	13@14	—@12	—@12	11@—
REDS—										
Carmine, No. 40, bulk, lb	4.75@5.50	4.75@5.50	5.00@6.50	5.00@6.50	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	2.50@2.75
Crocus martus	3@5	3@5	3@5	3@4½	1.55@3.50	1.55@3.50	1.55@3.50	1.55@3.50	1.55@3.50	1.55@3.50
Indian red, standard	7@9½	5@6	5@6	5@6	2.50@5.00	2.50@5.00	1.50@5.00	1.50@5.00	1.50@5.00	1.50@1.60
Rose pink	30@45	30@45	30@45	28@40	22@30	22@30	16@24	8@12	8@12	8@10½
Tuscan red	25@30	20@30	20@30	20@26	10@18	10@18	7@15	4@12	4@12	7@10
Venetian red	2@2¾	2@2¾	2@2¾	2@2¾	75@2.00	75@2.00	75@2.00	75@1.75	75@1.75	1.15@1.75
Oxide, red	3@8½	3@8½	2@8½	3@8½	2½@9	2½@9	2½@9	2@10	2@10	2¾@10
Para, pure (toners)	2.25@2.50	2.50@3.00	2.75@3.25	*2.50@3.00	nominal	nominal	1.15@1.65	80@1.00	80@1.00	60@70
commercial	40@60	40@60	50@75	55@75	16@70	16@70	16@70	7@45	7@45	7@45
Vermilion, English	1.50@1.60	1.50@1.60	1.50@1.60	*3.00@3.50	1.75@—	1.40@1.50	1.20@—	—@—	—@—	55@59
Chinese	95@1.00	95@1.00	95@1.00	95@1.00	95@1.00	95@1.00	95@1.00	90@1.00	90@1.00	90@1.00
YELLOWS—										
Chrome, chemically pure, lb	25@28	25@20	40@65	40@58	13@17	12@16	12¼@14	10¾@12	10¾@12	10¾@12
Ocher, French	2¼@3	2¼@3	2¼@3	2¼@3	2@2¼	2@2¼	2@2¼	1¾@2¼	1¾@2¼	1¾@2¼
foreign, golden	4¾@5½	4¾@5½	4¾@5½	4½@6¼	3@4	3@4	3@4	3@4	3@4	3@4
domestic, ton	20@30	20@30	20.00@30.00	18.00@26.00	14.00@20.00	14.00@20.00	14.00@20.00	12.00@16.00	12.00@16.00	12.00@16.00
golden, lb	6@8	6@8	6@8	5@6	4@5	4@5	4@5	4@5	4@6	4@5

* Nominal.

METALLIC PAINTS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Brown, ton	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00	18.00@20.00
Red	14.00@18.00	14.00@18.00	14.00@18.00	14.00@18.00	14.00@18.00	14.00@18.00	14.00@18.00	14.00@18.00	14.00@20.00	14.00@18.00

SHELLAC.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
D. C	49@49½	38@39	32@—	30@31	—@26	22½@23	22@25	23@24	24@25	21@22
V. S. O	48@48½	38@39	32@—	30@31	25@26	21½@22½	22@23	22@23	23@24	20½@21
Diamond I	47@47½	37@38	30@—	29@30	25@26	20½@21	20@21	22@23	23@24	20@21
Fine orange	42@43	34@35	28@—	26@27	22½@23	18@19	17@19	17@19	17@19	18½@19
Second orange	40@40½	32@34	26½@27	25@26	21½@22	16@16½	15½@16	15½@16	15½@16	17@18
T. N	39@40	31@32	26@—	23½@24	21@22	15@15½	13¾@14½	14@14½	14½@15	15½@16
A. C. garnet	37@37½	29@30	24@—	22@23	19@20	15½@16	14@15	14½@15	15@15½	16@17
Kaja button	34@35	25@27	22½@—	20@22	17½@18	13@14	—@—	—@—	—@—	13@14
Button	*48@50	37@40	30@36	30@32	28@30	26@27	26@27	26@27	26@27	23@24
Bleached, fresh ground, "commercial"	39½@40½	31@32	28@29	25@26	19@20	14½@15	14@15	14@15	14½@15	15@16
kiln dried, bone dry	48@49	38@40	34@35	31@32	24@25	18@19	18@18½	18@19	19@20	20@21

MADERO BROS.

INCORPORATED

Chemical Department

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Light SODA ASH Dense

CAUSTIC SODA, solid, granular, 60-62-64-70-74-76%

Domestic CHLORIDE OF LIME (BLEACHING POWDER) 35-37% Export

GLYCERINE, C P in drums and tins

SALTPETRE, double refined 99.8%

EPSOM SALTS, U. S. P.

BORAX, powdered and crystals

BLUE VITRIOL (Sulphate of Copper

BICHROMATES

Pharmaceutical Department

Acetanilid
Acetphenetidin
Acid Benzoic
Acid Citric
Acid Tartaric
Acid Pyrogallic
Acid Salicylic
Benzaldehyde F. F. C.
Creosote, Beechwood
Creosote Carbonate
Coumarin
Guaiacol
Guaiacol Carbonate
Beta Naphthol Benzoate
Potassium Permanganate
Phenolphthalein
Potassa Caustic Purific. Sticks
Potassium Guaiacol Sulphonate
Saccharin
Sodium Benzoate U. S. P.
Sugar of Milk

All Other Chemicals

COLORS IN OIL.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Black coach, Japan, lb	24@32	24@32	24@32	24@32	20@30	20@30	20@30	20@30	20@30	20@30
in oil	16@22	16@22	16@22	16@22	14@18	14@18	14@18	14@18	14@18	14@18
drop	16@22	16@22	16@22	16@22	14@16	14@16	14@16	14@16	14@16	14@16
lampblack	24@30	24@30	24@30	24@30	12@14	12@14	12@14	12@14	12@14	12@14
Blue, Chinese	1.50@1.75	1.50@1.75	1.80@2.00	2.35@—	1.50@1.60	70@80	70@80	36@46	36@46	36@46
Prussian	1.45@1.70	1.45@1.70	1.80@2.00	2.25@—	1.60@1.70	64@70	64@70	32@36	32@36	32@36
Ultramarine	40@50	40@50	30@50	30@50	15@20	15@20	15@20	13@16	13@16	13@16
Brown, Sienna, burnt	16@22	16@22	16@22	16@22	12@15	12@15	12@15	12@15	12@15	12@15
raw	16@22	16@22	16@22	16@22	12@15	12@15	12@15	12@15	12@15	12@15
umber, burnt	15@21	15@21	15@21	15@21	11@14	11@14	11@14	11@14	11@14	11@14
raw	15@21	15@21	15@21	15@21	11@14	11@14	11@14	11@14	11@14	11@14
Vandyke, brown	25@*30	25@*30	*25@30	*25@30	11@14	11@14	11@14	11@14	11@14	11@14
Green, chrome	70@—	70@—	30@75	90@95	30@45	30@45	30@45	12@16	12@16	12@16
Paris	—@35	—@35	—@35	—@24	—@24	—@24	—@24	—@24	—@24	—@24
Greek, chrome	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Paris	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Red, Indian	15@20	15@20	15@20	15@20	12@16	12@16	12@16	12@14	12@14	12@14
Venetian	10@12	10@12	10@12	10@12	8@10	8@10	8@10	6@8	6@8	6@8
Yellow, chrome	30@38	30@38	50@60	50@60	30@40	22@25	22@25	16@20	16@20	16@20
ocher, French	11@13	11@13	8@10	8@10	8@10	8@10	8@10	6@8	6@8	6@8

* Nominal.

OTHER PAINT MATERIALS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Bronze powder, lb	95@5.00	75@5.00	75@5.00	1.00@5.00	85@4.00	65@4.00	65@4.00	45@3.15	45@3.15	45@3.15
Casein	17@26	17@26	18@28	*25@—	17@18	11@12	7¼@8½	7¼@8½	—@—	—@—
Chalk, English	Nominal	Nominal	nominal	nominal	nominal	nominal	4.00@—	3.50@—	3.50@—	2.75@3.00
French	Nominal	Nominal	nominal	nominal	nominal	nominal	nominal	nominal	nominal	3.10@3.50
Clay, China, imported	15.00@32.00	15.00@32.00	18@38	12.50@20.00	11.00@16.00	16.00@24.00	16.00@24.00	14.00@16.00	14.00@16.00	14.00@16.00
domestic	12@15	12@15	12@15	10.00@12.00	8.00@9.00	8.00@9.00	8.00@9.00	8.00@9.00	8.00@9.00	8.00@9.00
Cobalt, oxide, lb	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05
Feldspar, ton	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00	8.00@12.00
Fuller's earth, powdered, per 100 lbs	80@1.05	80@1.05	80@1.05	80@1.05	80@1.05	80@1.05	80@1.05	80@85	80@85	80@85
Marble flour, ton	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50
Manganese, car lots	60.00@100.00	60.00@100.00	60.00@100.00	60.00@100.00	200.00@—	115.00@—	65.00@70.00	65.00@70.00	65.00@70.00	65.00@70.00
Magnesite, raw, ton	10@11	10@11	10.00@11.00	10.00@11.00	10.00@11.00	10.00@11.00	10.00@11.00	10.00@11.00	10.00@11.00	10.00@11.00
calcined, powdered	30.00@35.00	30.00@35.00	39.00@35.00	39.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00	30.00@35.00
Plaster of paris, lb	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70	1.50@1.70
dentists'	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85	1.50@1.85
Pumice stone, original casks, lb	3@4	3@4	3@4	3@4	2@4	2@4	2@4	2@4	2@4	2@4
selected, lumps, in barrels	7@10	7@10	7@10	5@8	5@8	5@8	5@8	4½@6	4½@6	4½@6
powdered, pure, lb	3@4	3@4	3@4	2@3	2@3	2@3	2@3	1½@2	1½@2	1½@3
Putty, commercial, 1, 2, 3, 5-lb. tins	3.30@4.00	3.30@4.00	3.30@4.00	3.30@4.00	2.65@3.25	2.65@3.25	2.75@3.25	2.65@3.25	2.65@3.25	2.65@3.25
pure, in do	3.70@4.80	3.70@4.80	3.70@4.80	3.70@4.80	2.95@3.85	2.95@3.85	2.95@3.85	2.95@3.85	2.95@3.85	2.95@3.85
linseed oil, in do	5.30@5.75	5.30@5.75	5.30@5.75	5.30@5.75	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60
colored, in do	5.30@5.75	5.30@5.75	5.30@5.75	5.30@5.75	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60
white lead, in do	5.30@5.75	5.30@5.75	5.30@5.75	5.30@5.75	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60	4.25@4.60
commercial, in bladders	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00	1.70@2.00
pure, in do	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20	2.05@2.20
linseed oil, in do	4.00@4.50	4.00@4.50	4.00@4.60	4.00@4.50	3.35@3.50	3.35@3.50	3.35@3.50	3.35@3.50	3.35@3.50	3.35@3.50
Rotten stone, original casks, lb	4@7½	4@7½	4@7½	4@7½	4@7½	4@7½	4@7½	4@7½	4@7½	4@7½
selected, lumps	5½@20	5½@20	5½@20	5½@20	5½@20	5½@20	5½@20	5½@20	5½@20	5½@20
powdered, in barrels	2½@4	2½@4	2½@4	2½@4	2½@4	2½@4	2½@4	2½@4	2½@4	2½@4
Soapstone, powdered, bags, ton	10.00@12.50	10.00@12.50	10.00@12.50	10.00@12.50	10.00@12.00	10.00@12.00	10.00@12.00	10.00@12.00	10.00@12.00	10.00@12.00
Silex	20.00@36.00	20.00@36.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00	12.00@40.00
Smalt, German, blue, lb	6@10	6@10	6@10	6@10	6@10	6@10	6@10	6@10	6@10	6@10
super, black	4@7	4@7	4@7	4@7	4@7	4@7	4@7	4@7	4@7	4@7
Talc, American, ton	10.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	9.00@13.00	15.00@20.00	15.00@20.00	15.00@20.00
French	15@22	15@22	15@22	5.00@12.00	15.00@20.00	15.00@20.00	15.00@20.00	15.00@25.00	15.00@25.00	15.00@25.00
Italian	35.00@—	20@35	20@35	18.00@30.00	18.00@30.00	18.00@30.00	18.00@30.00	35.00@40.00	35.00@40.00	35.00@40.00
Terra alba, American, No. 1, 100 lbs	85@90	85@90	85@90	75@80	75@80	75@80	75@80	75@80	75@80	75@80
No. 2	70@75	70@75	70@75	60@65	60@65	60@75	60@65	60@65	60@65	60@65
English	1.00@1.10	1.00@1.10	1.00@1.10	90@1.00	90@1.00	90@1.00	90@1.00	90@1.00	90@1.00	90@1.00
French	90@1.10	90@1.10	90@1.10	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00
Whiting, com	95@—	90@—	70@75	60@65	50@55	50@55	45@50	45@50	45@50	45@50
gilders'	1.15@—	1.08@—	80@85	70@75	60@65	60@65	55@65	55@65	55@65	55@65
extra gilders'	1.25@—	1.15@—	85@90	75@80	65@70	65@70	55@68	55@68	55@68	55@68
American paris white	1.25@—	1.15@—	80@85	70@75	70@75	70@75	70@76	70@75	70@75	70@75
English cliffstone	1.50@1.80	1.25@1.60	1.00@1.50	1.00@1.50	75@1.10	75@1.10	75@1.10	75@1.10	75@1.10	75@1.10

VARNISH GUMS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Zanzibar, bean, pea, white, lb	30@35	30@35	30@35	30@35	30@35	30@35	30@35	30@35	30@25	25@30
pea, white	25@—	25@—	25@—	25@—	25@—	35@—	25@—	25@—	25@—	20@—
sorts	58@62	58@62	58@62	58@62	58@62	68@62	58@62	58@62	58@62	55@58
bean and pea	28@30	28@30	28@30	28@30	28@30	28@30	28@30	28@30	28@30	24@26
Manila, pale	13½@14½	13½@14½	16@17	15@16	16@17	16@17	16@17	16@17	18@23	15@18
dark, hard	15@16	15@16	17@18	16@17	16@17	16@17	16@17	16@17	17@—	15@—
bright amber	15@16	15@16	17@18	16@17	16@17	16@17	16@17	16@17	16@17	14@15
standard sorts	7¾@8	7¾@8	10@11	10@11	9@13	9@13	9@13	9@10	10@11	8@8½
nubs, No 1	8¾@9½	8¾@9½	10@11	11@12	8½@8¾	8@8½	7½@—	9½@—	9½@—	8½@—
chips, No. 1	7½@8	7½@8	8¾@9	9@10	6@6¼	6@6¼	6@—	7½@—	8½@—	7@7½
Congo Copal, picture	35@40	35@40	35@40	35@40	35@40	35@40	35@40	35@40	35@40	30@34
white	20@—	20@—	16½@17	16½@17	25@—	23@—	20@—	23@30	25@30	25@30
amber	8½@—	8½@—	15@—	15@—	15@—	15@—	15@—	18@23	18@23	18@23
dark	12@17	12@17	12@17	12@17	12@17	12@17	12@17	12@17	12@17	12@17
Pontinak, sel., fine	22@24	22@24	22@24	22@24	22@24	22@24	22@24	22@24	22@24	22@24
straight	18@19	18@19	18@19	18@19	18@19	18@19	18@19	16@17	16@17	16@17
No. 1	18@19	18@19	17@18	16@17	13½@15	13½@15	13½@15	13½@15	13½@15	13½@15
No. 2	12@13	12@13	13@14	13@14	9@11	9@11	9@11	9@11	9@11	9@11
nubs	8¼@10½	8¼@10½	10@—	11@—	7@8	7@8	7@8	7@8	7@8	7@8
chips	9¼@10	9¼@10	9@—	10@—	7@7¾	7@7¾	7@7¾	7@7¾	7@7¾	7@7¾
Damar, Batavia	19¼@20	19¼@20	21@22	21@22	15¼@15½	15¼@15½	18@19	18@19	30@—	17½@—
Singapore, No. 1	21@22	21@22	23@24	24½@25	—@—	—@—	—@—	—@—	—@—	—@—
No. 2	16@17	16@17	17¼@18	18@19	13¾@—	13¾@—	13¾@—	14½@15	19@—	14@—
No. 3	9@10	9@10	9½@10	11@12	6¼@—	6¼@—	6¼@—	8@9	12@13	8@9½
Kauri, No 1	43@44	43@44	44@45	43@44	35@50	35@50	39@45	45@50	50@—	50@—
No. 2	28@30	28@30	28@30	26½@30	25½@—	25½@—	25½@—	32@—	32@—	32@—
No. 3	17@20	17@20	17@20	17@20	14@—	14@—	14@—	17@18	17@18	17@18
ordinary chips	13@14	13@14	13@14	14@15	13½@—	13½@—	13½@—	18@19	18@19	15½@16
B X	26½@30	26½@30	26½@30	26½@30	30@33	30@33	30@33	30@33	30@33	30@33
B 1, ordinary	24½@26	24½@26	24½@26	24½@26	20@22	20@22	20@22	20@22	20@22	20@22
B 2	16@17	16@17	16@17	16@17	16@—	16@—	16@—	16@—	13½@16	13½@16
brown chips, ordinary	9@10	9@10	9@10	9@10	7½@—	7½@—	7½@—	9@10	9@10	7½@9
extra	16@22	16@22	16@22	16@22	16@22	16@22	16@22	16@22	16@22	14@20
bright dust	12@14	12@14	12@14	12@14	12@14	12@14	12@14	12@14	10@12	10@12
brown dust	4½@5½	4½@5½	4½@5½	4½@5½	4@5½	4@5½	4@5½	3½@4	3½@4	3½@4
ordinary dust, white	8@9	8@9	8@9	9@10	5½@—	5½@—	5½@—	7@8	7@8	7@8
brown, No. 3	11@14	11@14	11@14	11@14	11@14	11@14	11@14	11@14	8@11	8@11
X dark	52@53	52@53	52@53	52@53	50@55	50@55	50@55	50@55	55@60	55@60
XX pale	59@60	59@60	59@60	56@57	54@57	54@57	54@57	54@57	60@65	60@65
XXX pale	70@72	70@72	70@72	65@66	60@65	60@65	60@65	60@65	65@70	65@70
XXXX extra pale	90@95	90@95	90@95	85@90	75@80	75@80	75@80	75@80	75@80	75@80
XXXXX picture quality	1.20@1.25	1.20@1.25	1.20@1.25	1.10@1.15	80@90	80@90	80@90	80@90	80@90	80@90

GLUES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Extra white, lb	25@33	18@24	18@24	18@24	18@24	18@24	18@24	18@24	18@24	18@24
Medium white	22@23	16@17	16@17	12@18	12@18	12@18	12@18	12@18	12@18	12@18
Cabinet	19@20	13@15	13@15	13@15	13@15	13@15	13@15	13@15	13@15	13@15
Low grade	20@21	14@15	14@15	10@12	10@12	10@12	10@12	10@12	10@12	10@12
Foot stock, white	18@19	12@14	12@14	12@14	12@14	12@14	12@14	12@14	12@14	12@14
brown	15@17	9@11	9@11	9@11	9@11	9@11	9@11	9@11	9@11	9@11
Common bone	16@20	10@14	10@14	7½@9	7½@9	7½@9	7½@9	7½@9	7½@9	7½@9
Irish	21@23	15@17	15@17	13@15	13@15	13@15	13@15	13@15	13@15	13@15
French	26@50	20@50	20@50	10@40	10@40	10@40	10@40	10@40	10@40	10@40
German, hide	12@*18	*12@18	*12@18	12@18	12@18	12@18	12@18	12@18	12@18	12@18
common	10@*12	*10@12	*10@12	10@12	10@12	10@12	10@12	10@12	10@12	10@12
Fish, liquid, bbls., 50 gls. each, gal	80@1.40	80@1.40	80@1.40	70@1.40	70@1.40	70@1.40	70@1.40	70@1.40	70@1.40	70@1.40

NAVAL STORES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Spirits of turpentine	55@55½	47@—	42@—	55@—	50½@—	41@41½	43@—	47½@—	45½@—	47½@48
Wood turpentine, steam-distilled	51@—	41@—	40@—	51@—	52@—	39@40	38@—	43@44	43@44	42@43
destructive distilled	46½@—	39½@—	38@—	45@—	42@—	34@37	31@37	37@—	38@—	36@38
Rosin, common to good, strained, 280 lbs	6.65@—	6.25@—	5.20@—	5.00@—	6.00@—	3.65@—	3.25@—	3.50@—	3.70@—	4.00@4.10
Large Florida Graded Rosins—										
B	6.65@—	6.30@—	5.50@—	5.20@—	6.00@—	3.75@—	3.50@—	3.55@—	3.80@—	4.20@—
D	6.65@—	6.35@—	5.65@—	5.25@—	6.00@—	3.80@—	3.00@—	3.55@—	3.80@—	4.30@—
E	6.65@—	6.55@—	5.70@—	5.30@—	6.00@—	3.85@—	3.65@—	3.55@—	3.80@—	4.30@—
F	6.70@—	6.60@—	5.80@—	5.40@—	6.00@—	3.90@—	3.80@—	3.60@—	3.80@—	4.30@—
G	6.75@—	6.70@—	5.85@—	5.45@—	6.10@—	3.95@—	3.80@—	3.70@—	3.80@—	4.40@—
H	6.85@—	6.75@—	5.85@—	5.50@—	6.15@—	4.00@—	3.80@—	3.75@—	3.80@—	4.40@—
I	6.90@—	6.80@—	5.90@—	5.60@—	6.20@—	4.00@—	3.85@—	3.75@—	3.95@—	4.45@—
K	6.95@—	6.85@—	6.10@—	5.75@—	6.60@—	4.10@—	4.35@—	3.80@—	4.50@—	4.70@4.85
M	7.10@—	6.90@—	6.25@—	5.90@—	6.80@—	5.00@—	4.90@—	4.60@—	5.00@—	5.15@5.30
N	7.40@—	6.95@—	6.50@—	6.15@—	7.35@—	5.35@—	5.90@—	5.50@6.00	5.90@—	6.00@6.25
W. G	7.70@—	7.10@—	6.75@—	6.30@—	7.60@—	6.40@—	6.75@—	6.05@—	6.25@—	6.20@6.30
W. W	7.85@—	7.25@—	7.00@—	6.40@—	7.85@—	6.50@—	6.95@—	6.50@6.55	6.40@—	6.75@—
Pitch, bbls., 200 lbs	4.25@4.75	4.00@4.75	3.50@4.00	3.50@—	3.50@—	3.00@3.50	3.00@3.50	3.00@3.50	3.75@4.00	3.75@4.00
Tar, kiln-burned	9.00@9.25	7.00@7.25	6.50@—	6.00@6.50	6.00@6.50	5.25@5.50	5.00@5.25	5.00@5.25	—@6.00	—@6.50
retort	9.25@9.50	7.25@7.50	7.00@—	6.00@6.50	6.00@6.50	5.25@5.50	5.25@5.50	5.25@5.50	—@6.00	—@6.50

Acid-Proof Chemical Stoneware

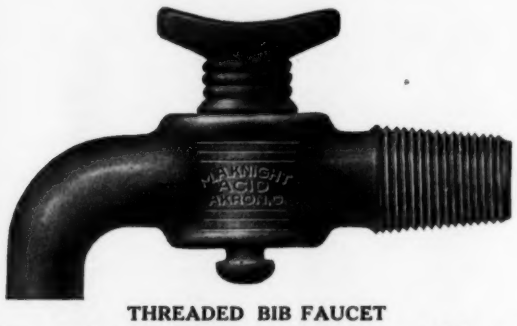
FOR EVERY PURPOSE

A Stoneware that is Acid Proof and Vitrified All Through. Our Ware is Not Dependent Upon a Glaze, Enamel or Veneer

IT IS THE BODY ITSELF

LARGE LIP, DOUBLE HANDLE ACID PITCHERS
Any capacity, from one pint to six gallons.

ACID-PROOF FLANGED VAPOR PIPE
Made in many sizes and designs. Guaranteed to withstand heat and cold action.



THREADED BIB FAUCET
Faucets and stopcocks are made in any bore up to 6 in , and in all designs. All tested to 60 lbs. pressure and guaranteed acid-proof throughout.
Notice the deep, lathe-cut screw threads.

NO PIECE WORK

ACID-PROOF LABORATORY SINK
Made in any size or design. With or without back. We make acid-proof traps and waste lines, with all kinds of fittings; also tanks and jars.

We are now in position to give

PROMPT DELIVERIES

—as we have quadrupled our capacity.

We make every description of Acid-Proof Chemical Stoneware, from special pieces to complete plants.

Our ware is not the cheapest. ***But it must be right.***

Our ware is not fancy. ***But it is guaranteed.***

Our clay and method of manufacture is ***not*** the same as used by others in our district.

Durability in Operation

Accuracy in Measurement

Service and Honesty in Delivery

WE CARRY A LARGE STOCK OF ACID-PROOF BRICK AND ALL FORMS OF TOWER PACKING

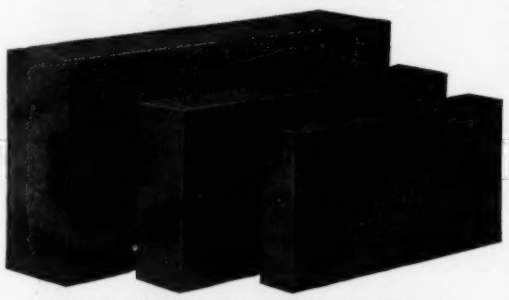
OUR WARE WILL WITHSTAND THE ACTION OF ALL ACIDS, ALKALIS AND CHEMICALS

HOT or COLD
STRONG or WEAK

EVAPORATING PANS
Made in many sizes and designs. Can be furnished with covers and handles.

EVAPORATING or CRYSTALLIZING PAN
Made in many sizes and designs.

LOW ACID-PROOF TANK
We make Acid-Proof Tanks in any design or capacity. Outlets and partitions as desired.



LARGE ACID-PROOF TOWER BASE TILE
Used for bridge work at bottom of large towers for supporting packing. Made in any size up to 60x36x6 in.

ACID-PROOF PARTITION RINGS
Notice curved partitions.
The most popular tower packing. Made in three standard sizes, 4x3 in., 4x6 in., 6x6 in.
All three sizes carried in stock. These rings afford a good draft and a maximum scrubbing service.

Let us send you prices and particulars

MAURICE A. KNIGHT, Office Kelley Ave., **East Akron, Ohio**

ASPHALTUMS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Asphaltum, Egyptian, lb	20@25	25@—	20@25	20@25	20@35	20@35	20@35	20@30	20@30	15@30
Cuban, ton	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00	30.00@60.00
Mexican	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00	25.00@60.00
Barbadoes, lb	5@8½	5@8½	5@8½	6@8½	5@8½	5@8½	5@8½	5@8½	5@8½	5@8½
California, ton	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00	22.50@30.00
Texas	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00	16.00@20.00
Trinidad	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00	25.00@30.00
Malta, lb	25@—	25@—	25@—	25@—	25@—	25@—	25@—	23@—	25@—	25@—
Gilsonite	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00	36.00@50.00
Manjak	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00	25.00@50.00

DRUGS.

OPIUM, MORPHINE AND CODEINE.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Opium, Turkey, druggists', cases, lb	13.50@—	11.00@—	11.40@—	11.50@—	11.00@11.25	8.25@8.30	7.00@7.25	7.50@7.75	8.90@—	7.75@7.75
jobbing lots	13.55@—	11.05@—	11.45@—	11.55@—	11.05@11.30	8.30@8.35	7.05@7.30	7.55@7.80	8.95@—	7.75@7.80
powdered	14.50@—	11.70@—	12.50@—	13.00@—	12.25@12.30	9.25@9.30	8.25@8.30	8.60@8.75	10.50@—	8.65@8.75
granular	14.50@—	11.85@—	12.50@—	13.00@—	12.50@12.60	9.35@9.50	8.35@8.40	8.90@9.00	11.00@—	8.75@8.85
Morphine, bulk, muriate and sulphate, 5-oz. cans, oz	7.00@7.30	5.50@5.60	5.50@5.60	5.50@5.60	5.50@5.60	5.00@5.05	5.00@5.05	5.00@5.05	5.00@—	4.95@—
acetate and alk., oz, vials	7.00@7.30	6.95@—	6.95@—	6.95@—	6.95@—	5.95@—	5.95@—	5.95@—	6.55@—	5.30@—
diacetyl hydrochloride	7.95@8.20	6.70@7.35	6.70@7.35	6.70@7.35	5.95@6.30	5.95@6.30	5.95@6.30	5.95@6.30	5.95@6.30	5.50@5.95
ethyl	8.85@9.10	7.45@7.75	7.65@7.75	7.65@7.75	7.15@7.35	7.15@7.35	7.15@7.35	7.15@7.35	7.15@7.35	6.45@6.55
Codeine, bulk, phosphate, oz	7.90@8.10	6.35@—	6.35@—	6.35@—	6.35@—	5.85@6.90	5.85@5.90	5.85@5.90	5.85@5.90	5.25@5.40
nitrate and muriate	7.40@7.60	7.50@—	7.50@—	7.50@—	7.50@—	6.45@6.50	6.45@6.50	6.45@6.50	6.45@6.50	5.50@5.65
alkaloid	8.85@9.05	8.50@—	8.50@—	8.50@—	8.50@8.60	6.45@6.50	6.45@6.50	6.45@6.50	6.45@6.50	5.75@5.90

QUININE.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Sulphate and bi-sulphate, manufacturers', quotation, 100-oz. tins, oz	55@—	50@—	75@—	75@—	75@—	40@—	30@—	26@—	26@—	26@—
50-oz. tins	55½@—	50½@—	75½@—	75½@—	75½@—	40½@—	30½@—	26½@—	26½@—	26½@—
25-oz. tins	56@—	51@—	76@—	76@—	76@—	41@—	31@—	27@—	27@—	27@—
5-oz. tins	57@—	52@—	77@—	77@—	77@—	42@—	32@—	28@—	28@—	28@—
1-oz. tins	60@—	55@—	80@—	80@—	80@—	45@—	35@—	31@—	31@—	31@—
second hands, American	55@60	50@58	70@75	90@1.10	1.05@1.15	57@62	28@30	25½@26	26@—	25@26
Java	55@66	50@58	70@75	72@72½	1.05@1.15	57@62	28@30	25½@26	25½@26	25@26
Cinchonine, alk., oz	23@—	20@—	20@29	23@—	18@—	14@—	14@—	13@—	25½@26	8@—
sulphate	15@—	12@—	15@28	15@—	10@—	7@—	6@—	5@—	13@—	7@—
Cinchonidine, alk., oz	80@85	50@85	1.07@1.16	83@—	90@—	30@—	26@—	24@—	24@—	18@—
sulphate	35@50	35@50	15@23	75@—	50@—	22@—	18@—	16@—	16@—	16@—

ACIDS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Benzoic, true, lb	*12.00@15.00	*11.50@12.00	*7.00@7.25	*4.50@5.00	*4.50@5.00	—@—	—@—	1.85@1.95	1.50@2.00	1.80@1.92
ex-tcluol	8.50@9.00	*11.50@12.00	6.85@6.80	4.00@4.60	4.00@4.60	3.25@—	2.75@3.00	1.85@1.95	75@80	23@24
Boric, crys. or gran., in sacks, lb	11¾@13¼	11¾@12¼	11¾@12¼	10¾@15	10@10½	9@9½	8¼@8¾	7¼@7¾	7@8	7@7
powdered, sacks	12@13¼	12@12½	12@12½	11@16	10¼@10¾	9¼@9¾	8¼@9	7¾@8	7¼@8	7¼@8
crys., gran. or pwd., bbls	11¾@16	11¾@15	11¾@15	11¾@15	10½@11	9½@10	8¾@9¼	8@8¼	—@—	—@—
Butyric, tech. 60 per cent	1.45@1.55	1.45@1.55	1.45@1.55	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Camphoric	4.20@4.30	4.20@4.30	4.20@4.30	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Carbolic, U. S. P., crys., in drums, lb	55@55½	55@60	65@72	1.10@1.25	1.35@1.40	1.50@1.60	1.50@1.60	1.10@1.20	50@52	10@10½
bottles, lb	60@63	63@65	72@75	1.20@1.35	1.35@1.40	1.50@1.60	1.50@1.60	1 10@1.20	50@52	10@10
Chrysophanic, lb	6.20@6.40	6.20@6.40	6.20@6.40	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Cinnamic, lb	4.90@6.20	4.90@6.20	4.90@6.20	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Citric, crys., dom., mfrs	65@65½	67@67½	67@67½	64@64½	59@59½	55@55½	55@55½	55@55½	55@55½	53@53½
in second hands	65@65½	62@63	75@78	70@75	61@62	55@56	75@80	—@—	—@—	—@—
Cresylic, 95@100%, gal	75@80	75@80	75@1.20	75@1.20	75@1.20	75@1.20	70@75	55@60	50@—	—@—
Gallic, U. S. P., lb	1.28@1.30	1.28@1.30	1.35@—	1.25@—	85@90	85@90	75@80	75@80	—@—	—@—
Picric, lb	75@95	1.00@1.25	1.50@1.75	1.00@1.50	1.50@2.00	1.75@2.00	1.40@1.90	1.00@1.70	—@—	—@—
Phosphoric, S. G. 1.750	30@34½	30@34½	30@34½	28@31	28@31	28@31	28@31	28@28½	28@28½	20@24½
S. G. 1.710	29½@34	29½@34	29½@34	25½@28	25½@28	25½@28	25½@28	27½@28	27½@28	19½@24
Pyrogallic, re-sub., lb	3.25@—	2.90@3.20	2.75@2.95	2.10@2.30	1.25@1.45	1.25@1.45	1.35@1.55	1.35@1.55	1.90@2.00	1.20@1.40
Salicylic	1.00@1.10	1.65@—	2.25@3.00	4.00@4.25	4.00@—	3.35@3.50	2.50@2.75	1.40@1.80	67½@70	22½@23
Tannic, U. S. P., bulk, lb	1.00@1.01	1.00@1.01	1.00@1.06	1.00@1.06	80@81	80@81	65@66	65@66	75@76	50@51
technical	65@80	65@80	60@63½	60@63½	45@50	45@50	45@50	45@50	45@50	55@56

BALSAMS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Copaiba, South American, lb	65@68	66@68	70@75	45@46	45@46	45@46	35@36	33@34	36@37	41@42
Para	48@50	52½@55	62½@63	65@70	43@45	43@45	32@33	31@32	35@36	44@45
Fir, Canada, gal	5.50@6.50	5.00@—	5.50@—	5.00@5.50	5.00@5.25	5.00@5.25	5.50@6.00	6.25@6.40	7.00@7.50	9.0 @10.00
Oregon	75@85	75@85	75@85	80@90	65@75	65@75	70@75	70@80	75@85	75@1.00
Peru, lb	3.45@3.75	3.50@3.75	3.90@4.00	4.00@4.25	5.25@5.50	4.75@5.00	3.75@4.00	2.65@2.75	1.55@1.65	1.50@1.60
Tolu	36@37	36@39	38@40	37@39	38@40	38@40	40@42	40@47½	45@47½	5.0@52½

BARKS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Angostura, lb	40@50	30@32	30@32	30@32	25@26	25@26	25@26	25@26	25@26	14½@18
Basswood	18@22	18@22	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Bayberry	6@7	6@7	6@7	6@7	6@7	6@7	7@8	7@8	7@8	5@6½
Blackberry, of root	6½@8	6½@8	6½@8	5½@6	5½@6	5½@6	5½@6	5½@6	5½@6	5½@6
of tree	9½@10½	9½@10½	9½@10½	9½@10	9½@10	9½@10	9½@10	9½@10	9½@10	9@9½
Buckthorn, true	30@32	30@35	40@42	1.00@1.25	*50@55	30@—	27@30	13½@15	18@19	20@22
Calisaya	19@28	19@28	19@28	19@28	19@28	19@28	19@28	19@28	19@28	17@25
Canella alba	18@20	18@20	20@—	20@—	20@—	20@—	20@—	20@20	18@20	15@20
Cascara sagrada	8½@10	7¾@10	7½@12	7½@12	6½@9	7@7½	7¾@10	7¾@10	7½@10½	8@10½
Cascarilla quills, long	25@—	25@—	25@—	25@—	25@—	25@—	25@—	25@—	25@—	22@24
quills, medium	22@—	22@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	18@19
siftings	12@15	12@15	12@15	12@15	12@15	12@15	12@15	12@15	12@15	11@12
Cinchona, red, quills	35@40	35@40	30@32	30@32	25@28	25@28	20@26	20@28	20@25	20@28
broken	27@35	30@35	25@—	25@—	22@23	22@23	17@19	17@19	17@19	12@18
yellow quills	*35@40	35@40	30@32	30@32	25@25	28@25	25@28	25@28	25@28	18@28
broken	*30@35	30@35	25@—	25@—	25@—	25@—	25@—	25@—	25@—	nominal
Loxa, pale, bls	25@26	25@26	25@26	25@26	25@26	21@—	21@—	21@—	21@—	20@—
powdered, bxs	18@18½	18@18½	18@18½	18@18½	18@18½	18@—	18@—	18@—	18@—	16@17
Maracaibo, yellow, powdered	*30@35	*30@35	15@18	15@18	15@18	15@18	15@18	15@18	15@18	14@15
Condurango	14@15	19@20	22@20	20@25	25@30	25@30	25@30	20@21	12@13	12½@14
Cottonroot	8@8½	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	6½@7
Cramp	14@16	6@7	6@7	5½@6	5½@6	5½@6	5½@6	5½@6	6@7	6½@7
Dogwood, Jamaica	6@7	6@7	6@7	6@7	6@7	6@7	6@7	6@7	6@7	5@6
Elm, bundels, select	16@20	16@17	18@20	18@20	18@19	18@19	20@22	20@22	22@23	17@19
grinding	8@10	14@15	14@15	14@15	14@15	14@15	14@15	14@15	16@18	9@9½
Lemon peel	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6	6½@7
Mezereon	25@30	25@30	25@30	35@40	35@40	12@13	12@13	12@13	12@13	9@10
Oak, red	8@9	8@9	8@9	8@9	8@9	8@9	8@9	8@9	8@9	8@9
white	3@5	3@5	3@5	3@5	3@5	3@5	3@5	3@5	3@5	3@5
Orange peel, bitter, Curocao, ¼s	4@5	4@5	4@5	3½@4	3½@4	3½@4	3½@4	3½@4	3½@4	4@5
sweet, Malaga, ribbons	6½@7	6½@7	6½@7	6½@7	4½@5	4½@5	5@6	5@6	5@6	8@10
quarters	*12@—	*12@—	*12@—	*12@—	*12@—	*12@—	*12@—	nominal	nominal	nominal
sweet, Trieste	—@10	—@10	—@10	—@10	—@10	—@10	—@10	—@10	—@10	6@7
Prickly ash, Southern	11@12	10@12	10@12	10@12	10@12	10@12	12@13	12@13	12@13	14@16
Northern	—@—	—@—	10@12	10@12	10@12	10@12	12@13	12@13	12@13	14@16
Pomegranate	25@—	25@—	25@—	25@—	25@—	25@—	25@—	25@—	25@—	12@13
of fruit	30@—	30@—	30@—	30@—	30@—	30@—	15@20	20@—	20@—	6@7
Quebracho	50@—	50@—	50@—	50@—	30@32	30@32	15@—	15@—	15@—	10@11
Sassafras, ordinary	11@17	11@17	11@17	10@14	10@14	11@13	11@12	11@13	11@13	12@15
select	15@16	15@16	15@16	15@16	15@16	15@1	15@16	15@16	15@16	16@18
Simarubra	15@18	15@18	15@18	15@18	15@18	15@18	15@18	15@18	15@18	11@12
Soap, whole	8@8½	8@8½	8@8½	8@8½	7¾@8¼	7¾@8¼	8¼@9	8¼@9	9@10	9@10
cut	13@16	15@16	11@12	15@13	15@16	15@16	15@18	16@18	12@12½	10½@11
crushed	9½@11	9½@11	10@11	9½@10½	9@10	9@10	15@18	11½@12	12@12½	9¾@10
Tonga	40@—	40@—	40@—	40@—	35@40	25@40	40@42	40@42	45@50	40@42
Wahoo, of root	30@33	26@33	26@33	26@33	33@35	33@35	33@35	36@40	36@40	42@50
of tree	14@16	12@15	12@15	12@15	12@15	12@15	12@15	12@15	12@15	15@18
Wild cherry	6@9	6@8	4½@8	4½@8	4½@8	4½@8	5@8	5@7	5@7	7@8
Witch hazel	3½@4	3½@4	3½@4	3½@4	3½@4	3½@4	3½@4	3½@4	3½@4	3½@4
White pine	6@6½	4½@5	4@5	4@5	4@5	4@5	4@5	3½@5	3½@5	4@5
White poplar	3½@4	4@5	4@5	4@5	4@5	4@5	4@5	3½@4	3½@4	3½@4

BEANS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Calabar, lb	22@25	22@25	22@25	20@25	20@25	20@25	20@25	20@25	20@25	25@30
St. Ignatius	20@22	18@20	18@20	18@20	18@20	18@20	18@20	18@20	20@21	18@20
Tonka, Angostura	90@95	85@90	80@82½	90@1.05	90@1.05	90@1.00	90@1.00	1.10@1.15	1.50@1.60	1.50@1.60
Para	55@60	50@55	50@55	65@70	65@70	65@70	65@70	75@85	85@95	nominal
Surinam, crystalized	60@65	60@65	70@75	75@80	75@80	75@80	75@80	85@90	90@1.10	1.10@1.15
Vanilla, Mexican, whole	4.75@6.50	5.00@7.00	4.50@6.00	4.00@5.00	3.75@5.00	2.75@4.00	2.75@3.50	2.75@3.50	3.50@5.00	4.00@5.00
cuts	3.75@4.25	3.75@4.25	3.75@4.25	3.25@3.50	3.25@3.50	2.37½@2.50	2.25@2.50	2.50@3.25	3.00@3.40	3.12½@3.50
Bourbon	2.50@3.50	2.60@3.50	2.60@3.50	2.75@3.50	2.50@3.50	2.25@3.00	2.25@2.50	2.50@3.00	3.50@4.00	3.37½@4.00
South American	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	2.50@3.00	2.50@3.00	2.75@3.50	3.50@3.75	3.50@3.75
Tahiti, white, lb	1.65@1.75	*1.75@1.85	*1.75@1.85	*1.75@1.85	*1.75@1.87½	*1.65@1.87½	*1.65@1.87½	nominal	nominal	nominal
green label	1.55@1.60	1.60@1.65	1.60@1.65	1.40@1.45	1.45@1.50	1.35@1.50	1.35@1.50	1.40@1.50	1.90@2.00	2.25@2.35

John C. Wiarda & Co.

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ZINC SULPHATE

Works and Office - - Provost *and* Freeman Streets
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BERRIES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Cubeb, ordinary, lb	42½@45	42½@45	42½@45	42½@45	42½@45	42½@45	45@50	45@50	47@50	38@40
XX	47½@50	47½@60	47½@50	47½@50	47½@50	47½@50	50@52½	50@52½	52½@55	42@44
powdered	45@50	45@50	45@50	45@50	45@50	45@50	47½@50	47½@50	50@60	42@44
Fish (cocculus indicus)	4½@5	4½@5	4½@5	4½@5	4½@5	3¼@3½	3¼@3½	3¼@3½	3¼@4	3¼@4
Horse nettle, dry	12½@13	12½@13	12½@13	12½@13	12½@13	12@12½	12@12½	12@12½	12@12½	11½@12
Juniper	5@5½	4¼@4½	4½@4½	4½@5	4@4½	3¼@4	4½@5	3¼@3¾	3¼@4	3¼@4
Laurel	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6
Prickly ash	12@14	12@14	11@13	11@13	13@14	14@15	13@14	15@16	15@17	25@30
Saw palmetto	6@8	6@8	8@9	8@9	8@9	8@9	9@10	9@10	8@9	9@10
Sloe	70@75	70@75	65@70	60@75	46@48	35@40	30@33	40@50	40@50	10@17

* Nominal

ESSENTIAL OILS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Almond, bitter, lb	12.00@13.50	*13.00@15.00	*12.00@15.00	*12.00@15.00	*9.00@11.00	7.50@8.50	6.00@6.75	4.75@6.75	4.75@6.75	3.50@4.50
artificial	5.50@6.50	6.50@8.00	6.50@8.00	6.50@8.00	5.50@6.00	*5.00@—	3.50@—	1.25@1.50	1.00@1.25	40@45
sweet, true	80@82½	85@—	85@—	85@—	85@—	85@—	85@—	80@—	75@80	80@90
peach kernel	35@40	35@37½	37½@40	40@42½	42½@45	42½@45	35@38	27½@30	27½@30	25@26
Amber, crude, lb	*1.00@1.50	Nominal	nominal	*90@—	*80@85	*20@25	12½@16	12½@15	12½@15	12@14
rectified	1.25@1.60	Nominal	Nominal	*1.65@—	*50@60	*32@35	20@22½	20@22½	20@22½	20@22½
Anise, lb	1.05@1.15	1.00@1.15	1.00@1.15	1.05@1.10	1.05@1.10	1.05@1.10	1.15@1.20	1.25@—	1.45@1.50	1.55@1.60
Bay, lb	2.50@2.75	2.50@2.75	2.50@2.75	2.50@—	2.50@—	2.15@2.25	2.25@2.40	2.25@2.40	2.40@2.50	2.40@2.50
Bergamot, lb	6.25@6.50	5.50@6.75	5.70@6.75	3.80@3.50	3.50@—	3.15@3.50	3.15@3.50	3.00@3.15	3.75@—	5.00@6.25
synthetic	2.75@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.50@2.75	2.50@2.75	2.50@2.75	—@—	—@—	—@—
Birch tar, crude, lb	Nominal	Nominal	30@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
refined	85@90	85@90	85@90	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Bois de Rose, lb	3.25@3.65	3.50@3.75	3.75@4.25	3.75@4.25	4.25@4.40	4.25@4.40	4.25@4.40	4.25@4.40	4.25@4.40	4.00@4.50
Cade, lb	65@70	50@55	50@55	45@60	35@—	20@—	20@—	20@—	20@—	16@20
Cajeput, lb	80@85	75@85	80@85	80@85	80@85	80@85	80@85	80@85	90@1.00	57½@65
Camphor, light color, heavy gravity, lb	12@13	12@13	13@14	12½@13	12½@13	12@13	12@13	12@13	15@16	13@14
Japanese, native	16@18	16@18	18@20	15@16	14@15	13@14	13@14	13@14	15@16	12½@13
Capsicum, oleoresin, lb	4.50@—	4.50@—	4.50@—	3.50@—	2.85@4.00	2.75@3.00	3.25@—	3.25@—	3.25@—	—@—
Caraway, lb	3.50@3.75	3.10@3.25	3.00@3.25	2.50@2.75	2.00@2.25	1.60@1.75	1.80@2.00	1.75@—	1.75@—	—@—
Cassia, 75@80%, tech., lb	1.07½@1.15	1.05@1.10	1.20@1.25	1.15@1.20	1.20@1.25	85@90	87½@90	82½@85	80@82½	82½@85
lead free	1.20@1.30	1.30@1.35	1.30@1.35	1.25@1.30	1.25@1.30	95@1.00	97½@1.00	1.00@1.20	1.00@1.20	97½@1.07½
lead free, U. S. P	1.50@1.55	1.50@1.60	1.65@1.70	1.55@1.60	1.55@1.60	1.25@1.30	1.27½@1.30	1.25@1.30	1.25@1.30	1.27½@1.30
redistilled	1.60@1.70	1.65@1.70	1.75@1.80	1.65@1.70	1.65@1.70	1.30@1.35	1.37½@1.40	1.25@1.35	1.40@1.50	1.30@1.40
Cedar leaf, lb	80@85	90@95	75@80	50@52½	50@52½	50@52½	50@—	52½@60	52½@60	60@65
wood	15@16	15@16	15@16	14@16	14@16	15@16	15@16	15@16	15@16	14@15
Cinnamon, Ceylon, heavy, lb	20.00@—	20.00@—	18.00@—	15.00@15.50	12.00@12.50	7.50@8.00	7.00@7.25	6.00@7.50	6.00@7.50	6.50@14.00
Citronella, Ceylon, drums, lb	46@48	50@51	54@55	50@51	42@43	39@40	44@45	43@44	43@44	48@49
cans	48@50	51@52	55@56	51@52	43@44	41@42	45@46	44@45	44@45	49@50
Java	80@85	85@87½	90@95	90@95	90@95	1.00@1.05	1.05@1.10	1.30@1.35	1.30@1.35	1.25@1.30
Cloves, cans, lb	1.22½@1.25	1.25@—	1.20@1.25	1.40@1.42½	1.40@1.42½	1.05@1.10	1.12½@1.15	1.12½@1.15	1.05@1.15	97½@1.00
bottles	1.25@1.27½	1.27½@—	1.25@1.27½	1.42½@1.45	1.42½@1.45	1.10@1.15	1.15@1.20	1.15@1.20	1.10@1.20	1.00@1.02½
Copaiba, lb	1.00@1.10	1.00@1.10	1.10@—	85@1.00	90@95	90@95	80@90	90@1.00	90@1.00	90@95
Coriander, lb	10.00@12.00	9.75@10.00	*35.00@—	*18.00@20.00	*15.00@—	7.50@8.00	7.25@7.75	6.00@7.00	6.50@7.50	5.50@7.50
Croton, lb	95@1.00	95@1.00	95@1.00	95@1.00	85@90	85@90	85@90	90@1.00	95@1.05	90@1.00
Cubeb, lb	3.25@—	3.25@—	3.25@—	3.25@—	2.85@3.00	2.75@3.00	2.85@3.00	3.00@3.25	3.00@3.25	2.75@2.85
Cumin, lb	4.25@4.35	4.00@4.25	4.00@4.25	4.00@4.25	4.00@4.25	4.00@4.25	3.90@4.00	3.90@4.00	3.90@4.00	—@—
Erigeron, lb	1.00@1.05	1.00@1.05	1.00@1.05	90@1.05	90@1.05	90@1.05	90@1.05	90@1.05	1.30@1.40	1.30@1.40
Eucalyptus, Australian, lb	70@75	65@70	65@70	65@70	47½@50	37½@45	45@50	45@50	45@50	45@50
Fennel, seed, sweet, lb	4.00@4.50	4.50@5.50	4.00@4.25	4.25@—	3.75@4.00	3.00@3.50	2.75@3.00	2.50@2.75	2.50@2.75	1.90@2.00
Geranium, Turkish, lb	3.25@3.65	3.50@3.90	3.50@4.00	3.10@3.25	3.10@3.25	3.10@3.35	3.10@3.25	3.10@3.25	3.25@3.50	3.00@3.25
rose, Africa	3.90@4.00	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	4.00@4.25	4.25@4.50	4.75@5.00
Bourbon	3.25@3.50	3.25@3.50	3.25@—	3.25@3.50	3.00@3.25	3.00@3.25	3.50@3.75	3.50@3.75	3.75@4.00	3.25@3.35
Ginger, lb	7.75@8.00	6.50@7.00	5.50@6.00	5.00@5.50	5.00@5.50	6.00@5.50	5.50@6.00	5.50@6.00	6.00@6.50	4.25@4.40
Gingergrass, lb	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00	1.75@2.00
Hemlock, lb	62½@65	55@57½	55@57½	55@57½	55@57½	55@57½	50@60	50@55	45@50	50@55
Juniper berries, rectified, lb	15.00@16.50	8.50@—	*6.50@7.00	*6.50@7.00	3.75@4.00	1.75@—	1.15@1.25	1.15@1.25	1.15@1.35	75@1.00
twice rectified	16.00@17.50	*8.50@—	*6.75@7.25	*6.00@8.00	4.00@4.50	2.00@—	1.50@1.75	1.50@1.75	1.50@1.75	85@1.00
wood	1.65@3.50	1.25@1.40	1.25@1.40	75@1.15	65@1.15	25@30	25@30	30@40	24@25	23@25
Lavender flowers, lb	3.90@4.25	3.90@4.25	4.00@4.25	4.00@4.25	4.00@4.25	3.25@4.00	3.50@4.00	3.50@4.00	3.50@4.75	3.75@4.00
spike	1.20@1.40	1.20@1.40	1.20@1.40	1.20@1.40	1.25@1.50	1.25@1.50	1.10@1.25	1.10@1.25	1.40@1.50	90@1.10
garden	60@80	60@80	60@70	60@80	60@70	60@80	60@80	50@80	60@80	52½@70
Lemon, lb	1.05@1.15	1.00@1.05	95@1.10	95@1.10	1.00@1.10	1.05@1.15	1.10@1.25	1.10@1.15	1.10@1.25	1.90@2.25
Lemongrass, lb	80@85	80@85	80@85	80@85	80@1.00	80@1.00	80@95	80@95	95@1.00	1.00@1.10
Limes, expressed, lb	3.50@4.00	3.15@3.25	3.15@3.25	2.75@3.00	2.75@3.00	2.75@3.00	2.75@2.85	2.85@2.75	3.00@3.10	3.25@3.50
distilled	2.75@3.00	2.75@3.00	2.75@3.00	2.25@2.50	2.25@2.35	2.35@—	1.60@—	1.10@1.15	1.35@1.40	75@80
Linalos, lb	2.85@3.00	2.85@3.00	2.85@3.00	2.75@—	2.25@2.35	2.25@2.35	2.40@2.50	2.60@2.75	2.75@2.85	3.75@4.00
Mace, distilled, lb	1.20@1.30	1.05@1.10	1.15@1.20	97½@1.00	90@—	90@—	90@—	85@—	85@—	70@75
expressed	1.05@1.10	1.05@1.10	1.05@1.10	75@80	90@1.00	90@1.00	90@1.00	90@1.00	90@1.00	75@80
Maleforn, lb	*10.00@12.00	9.00@9.50	nominal	*7.00@—	*8.00@6.50	6.00@—	1.90@2.25	2.50@2.75	2.50@2.75	1.90@2.20
Mustard, natural, lb	22.00@23.00	20.00@21.00	19.00@22.00	*22.00@—	*10.00@10.50	7.00@7.50	5.00@5.25	5.00@6.00	5.00@6.00	3.50@4.00
artificial	28.00@30.00	19.00@20.00	19.00@20.00	*20.00@—	*11.00@11.50	4.75@5.00	4.00@—	2.25@—	2.25@2.30	1.25@1.30
expressed	90@1.00	90@1.00	90@1.00	90@1.00	—@—	—@—	—@—	—@—	—@—	—@—
Neroli, petale, lb	45.00@50.00	45.00@50.00	45.00@50.00	45.00@50.00	45.00@50.00	45.00@50.00	50.00@—	50.00@—	60.00@—	51.00@55.00
bigarade	35.00@50.00	35.00@50.00	35.00@50.00	35.00@50.00	35.00@50.00	35.00@40.00	35.00@40.00	35.00@40.00	55.00@—	40.00@50.00
synthetic	*18.00@20.00	*18.00@20.00	*18.00@20.00	*18.00@20.00	—@—	—@—	—@—	—@—	—@—	—@—
Nutmegs, lb	1.10@1.25	1.05@1.10	1.15@1.20	95@1.00	85@—	85@—	85@—	85@—	85@—	70@75
Orange ,sweet, Italian, lb	3.00@3.20	3.00@3.10	2.75@—	1.90@2.20	1.90@2.00	1.75@2.00	1.75@1.90	1.55@1.60	1.60@1.75	2.15@2.40
West Indian	2.25@2.35	2.75@2.80	2.50@2.75	1.75@1.80	1.50@1.60	1.70@1.75	1.50@1.60	1.25@1.35	1.50@1.60	2.05@2.10
bitter	2.50@3.25	2.25@2.75	2.25@2.75	1.95@2.00	2.00@2.10	2.00@2.10	2.00@2.10	1.75@2.00	—@—	—@—
Origanum, lb	18@25	18@25	18@25	18@25	18@25	18@25	18@25	18@25	18@25	17@45
Patchouli, lb	15.00@16.00	13.00@15.00	15.00@17.50	15.00@—	8.00@9.00	4.50@4.75	4.00@4.25	4.00@4.25	4.00@4.25	4.00@4.85
Pennyroyal, American, lb	1.65@1.85	1.65@1.85	1.65@1.85	1.75@1.85	1.75@1.85	1.75@1.85	1.75@1.85	1.75@1.85	1.75@1.85	1.75@2.00
French	1.25@1.50	1.25@1.30	1.40@1.50	1.50@1.60	1.60@—	1.60@—	1.35@1.50	1.30@1.35	1.35@1.50	1.05@1.25
Peppermint, tins, lb	2.15@2.25	2.30@2.40	1.80@1.85	1.95@2.10	1.95@2.10	1.60@1.65	1.60@1.65	1.55@1.60	1.35@1.40	2.75@3.10
branded, bots	2.85@2.90	2.85@2.90	2.65@2.70	2.65@2.70	2.65@2.70	2.45@2.50	2.45@2.50	2.45@2.50	2.50@2.60	4.15@4.20
Petitgrains, French, lb	6.00@6.50	6.00@6.50	6.00@6.50	6.00@6.50	6.00@6.50	7.00@7.25	7.00@7.25	7.00@7.25	7.25@7.50	4.75@6.00
South American	2.75@3.00	2.75@3.00	3.00@3.25	2.70@3.00	2.70@3.00	2.70@3.00	3.00@3.25	3.25@3.50	3.50@3.75	3.25@3.50
Pimento, lb	1.75@1.80	1.75@1.80	1.75@1.80	1.75@1.80	1.75@1.80	1.65@1.70	1.80@2.00	1.80@2.00	1.80@2.00	1.70@2.00
Pine needles, lb	85@—	85@—	85@—	75@80	70@75	70@75	1.00@—	40@50	40@50	36@38
Rose, natural, oz	13.00@15.00	13.00@14.25	13.00@—	11.00@14.00	8.50@14.00	6.25@8.00	8.00@8.50	8.00@8.50	9.00@14.00	10.00@12.00
artificial	2.75@3.00	2.50@3.00	2.50@3.00	2.50@3.00	2.50@3.00	2.50@3.00	2.50@3.00	2.50@3.00	2.75@3.00	2.00@3.00
Rosemary flowers, French, lb	75@85	75@85	75@85	75@85	75@85	75@85	85@1.00	85@1.00	85@1.00	70@75
Saffrol, lb	40@45	40@45	40@45	33@—	26@27	28@29	30@34	30@31	31@33	27@28
Sandalwood, East Indies, lb	10.50@10.65	7.75@—	7.00@7.25	7.75@8.00	6.50@6.75	6.00@—	5.75@5.85	5.00@5.15	4.90@5.10	4.65@5.10
West Indies	3.75@4.25	3.25@3.50	3.25@3.50	2.75@3.25	1.75@1.85	1.15@1.25	1.25@1.30	1.15@1.25	1.15@1.25	1.15@1.25
Sassafras, natural, lb	70@75	70@75	70@75	65@75	65@75	75@—	70@75	75@—	65@70	55@65
artificial	28@29	27@28	27@28	23@24	23@24	23@24	23@24	24@26	25@35	22@28
Savin, lb	6.00@6.50	Nominal	nominal	*4.50@—	*3.00@3.25	2.50@2.60	3.00@—	2.00@2.25	2.25@2.50	1.80@1.90
Spearmint, lb	1.90@2.00	1.90@2.00	1.50@—	1.50@—	1.75@—	1.50@—	1.50@1.60	1.50@1.60	1.50@1.60	1.75@1.90
Spruce, lb	60@62½	50@60	50@60	50@60	50@60	50@60	50@60	45@50	45@50	45@55
Tansy, lb	2.50@2.75	2.25@2.30	2.25@2.30	2.50@2.65	2.50@2.65	2.50@2.65	2.90@3.00	2.90@3.00	2.90@3.00	3.75@4.00
Thyme, red, French, lb	1.30@1.60	1.30@1.60	1.30@1.60	1.30@1.60	1.30@1.60	1.30@1.60	1.30@1.60	1.15@1.60	95@1.15	1.30@1.40
white, French	1.50@1.55	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.10@1.25	1.40@1.50
Wintergreen, sweet birch, lb	2.75@2.95	2.50@2.75	2.65@2.75	3.25@3.50	3.75@4.10	2.25@2.50	2.25@2.35	2.25@—	2.00@—	1.45@2.00
synthetic	1.15@1.20	1.60@—	2.25@2.35	2.75@3.28	3.80@4.00	2.35@2.50	1.55@1.60	1.35@1.45	55@60	27½@30½
leaf, gaultheria	4.00@4.30	3.85@4.00	3.85@4.00	4.00@4.25	4.25@4.50	4.10@4.25	4.15@4.25	4.15@4.25	4.15@4.25	4.25@4.50
Wormseed, Baltimore, lb	3.50@3.75	2.40@2.50	2.15@2.25	2.15@2.25	2.00@2.25	1.85@1.95	2.00@2.20	1.75@1.80	1.40@1.50	1.40@1.50
Wormwood, lb	2.90@3.00	2.90@3.00	2.20@2.25	2.25@2.60	2.25@2.60	2.10@2.25	2.25@—	2.25@—	2.40@2.50	3.25@3.40

MEDICINAL AND OTHER GUMS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Aloes, Curacao, cases, lb	9@9¾	9@9¾	10@10½	13@14	14@15	13@14	11½@12	12¾@13	13@14	10@11
in gourds	20@22	25@27	27@30	27@30	15@17	13@14	12¾@13	12¾@13	13@14	9½@10
Barbadoes	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.25@1.40	1.15@1.20
Cape	8½@9	8¼@9	8¼@9	8@8¼	8¼@9	8¼@9	8@9	8@9	8@9	8@9¼
Socotrine	22@23	21@23	21@23	22@25	22@23	22@23	17@22	17@22	17@22	22@23
Ammoniac, tears, lb	25@30	25@30	25@30	—@30	—@30	—@30	12@—	12@—	12@—	20@25
Arabic, firsts, lb	*38@40	30@35	30@35	30@35	30@35	30@35	25@35	25@35	35@40	25@35
seconds	*36@37	28@30	28@30	28@30	28@30	28@30	24@26	24@26	24@26	19@23
thirds	*34@35	25@26	25@26	25@26	25@28	25@28	22@24	22@24	22@24	15@25
sorts, amber, clean	16@17	15@17	18@19	24@25	23@24	16@18	13@14	14@15	14@15	10½@11
white	32@34	25@26	27@28	27@30	25@27	19@23	18@25	18@25	23@25	15@16
Asafoetida, lump, lb	85@1.00	85@90	90@1.00	1.00@1.10	75@80	35@40	38@40	36@40	36@40	25@1.20
powdered	1.20@1.25	1.00@1.15	1.00@1.15	90@1.00	75@80	45@50	45@50	50@60	50@60	—@—
Benzoin, Siam, lb	1.35@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.15@1.50	1.00@1.25	1.75@2.00	1.75@2.00	1.50@2.00
Sumatra	32@40	33@40	33@40	33@40	32@40	31@33	33@35	33@35	35@36	34@40
Camphor, American, refined, bbls., bulk, lb	80½@—	69½@—	52@—	49@—	42@—	42@—	43@—	41@—	44@—	44@—
cases of 100 blocks	87@—	70@—	52½@—	49½@—	42@—	42½@—	43½@—	41½@—	45@—	45@—
squares of 4 ozs	87¼@—	70½@—	53@—	50@—	43@—	43@—	44@—	42@—	45½@—	45½@—
10s in 1-lb. cartons	88@—	72@—	54½@—	51½@—	44½@—	44½@—	45½@—	43½@—	47@—	46@—
24s and 32s in 1-lb. cartons	88½@—	72½@—	55@55½	52@52½	45@45½	45@45½	46@46½	44@44½	47½@48	47½@48
Japan, refined, 2½-lb. slabs	*88@90	72@73	50@63	49@63	42½@—	42@45	43½@46½	39@45	41½@43	44½@48
Chicle, lb	60@65	60@65	60@65	65@70	65@70	65@70	65@70	60@65	60@62½	60@65
Euphorbium, lb	20@—	20@—	20@—	20@—	16@18	11@15	25@—	20@—	20@—	12@14
Galbanum, lb	90@1.00	75@85	65@80	65@80	65@80	65@80	70@75	70@75	70@75	60@70
Gamboge, mass and pipe, lb	1.50@2.00	1.25@1.30	1.50@1.55	90@95	80@85	65@68	65@67½	65@67½	70@72½	60@70
powdered	1.60@2.10	1.35@1.50	1.60@—	85@90	85@90	68@70	65@67½	65@67½	70@75	65@67½
Gualac, lb	25@30	25@30	23@35	25@30	25@30	20@50	20@25	30@45	22@24	27@30
Kadaya, whole, lb	12@18	12@18	12@18	12@18	11@18	11@18	11@18	16@25	16@20	9@17
powdered	16@25	16@25	16@25	16@25	16@25	16@25	16@25	18@27	18@27	15@22
Kino, lb	50@60	50@60	50@60	40@45	40@45	40@45	40@45	40@45	40@45	22@25
Mastic, lb	38@40	40@41	42@43	44@45	48@50	48@50	50@51	65@68	75@80	62@65
Myrrh, select, lb	25@—	25@—	25@—	25@—	20@22	19@22	20@—	20@—	18@20	16@20
sorts	20@22	20@22	20@22	20@22	16½@17	16@18	16@18	16@18	16@18	15@16
siftings	20@—	20@—	20@—	20@—	16½@17½	17@18	15@16	15@16	15@16	13@16
Olibanum, siftings, lb	12@12½	12@12½	18@20	18@20	6¼@6½	6@6½	6½@7	6½@7	9@10	4½@5
sorts	35@—	35@—	14@—	14@—	7@10	7@10	7@10	6@6¼	12@14	9½@10
tears	14@15	11@12	14@15	13@15	11@15	10@11	11@13	10@11	12@13	10@12
Sandarac, lb	28@30	25@25¼	24@25	24@23	22@23	22@23	22@23	22@23	22@23	19@20
Scammony, resin, lb	2.50@2.75	2.50@2.75	2.50@2.75	1.90@2.00	1.90@2.00	1.35@1.75	1.40@1.75	1.40@1.75	1.40@1.75	1.75@2.00
Aleppo	3.00@3.25	3.00@3.25	3.00@3.25	2.50@2.75	2.50@2.75	2.50@2.75	2.50@2.75	2.50@2.75	2.50@2.75	2.50@2.75
virgin	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50	3.50@6.50
Senegal, picked, lb	22@24	22@24	22@24	22@24	18½@20	18@19	18@19	18@19	18@19	14@22
sorts	18@20	18@20	18@20	18@20	10@12½	10@12½	10@12½	10@12½	10@12¾	11¼@12½
Spruce, lb	65@90	65@90	65@90	65@90	65@90	65@70	65@70	65@70	65@70	65@1.15
Styrax, liquid, case, lb	3.00@3.25	1.50@1.75	1.00@1.10	1.00@—	40@75	18@20	25@35	20@22	29@30	18@20
Thus, lb	8.25@8.75	8.00@8.50	8.00@—	8.00@—	7.50@8.00	7.25@7.50	7.50@8.50	7.50@8.50	7.00@7.50	9.00@10.00
Tragacanth, Aleppo, firsts, lb	2.15@2.25	2.20@2.30	2.40@2.50	2.75@3.00	2.00@—	2.00@2.10	2.10@—	2.00@2.20	2.00@—	1.10@1.20
seconds	2.00@2.10	2.00@2.10	2.20@2.30	2.25@2.40	1.90@1.90	1.90@1.90	1.70@1.80	1.60@1.70	1.60@1.70	80@90
thirds	*1.90@2.00	*1.40@1.60	*1.40@1.60	*1.40@1.60	1.00@1.40	1.00@1.40	1.00@1.40	1.00@1.40	1.00@1.40	65@75
sorts	*75@85	*50@60	*50@60	*50@60	50@—	50@—	50@—	50@—	50@—	30@35
Turkey, firsts	*2.75@—	*2.75@—	*2.75@—	*2.75@—	*1.75@1.80	1.75@1.80	—@1.70	—@1.70	—@1.70	—@1.70
seconds	*2.25@—	*2.25@—	*2.25@—	*2.25@—	*—@1.20	—@1.20	—@1.20	—@1.20	—@1.20	60@70
thirds	*2.00@—	*2.00@—	*2.00@—	*2.00@—	*—@80	—@80	—@80	—@80	—@80	40@50

* Nominal.

THE year 1916 will long be remembered as one testing every resource of American mechanical skill and brawn.

—and that virtue called "patience"!

She has almost slipped off her monument and down into the depths of despair.

Patient, unremitting effort, however, has pushed service and efficiency into the highly developed commercial saddle and conditions, while possibly abnormal, are healthy and progressive.

1917 promises another strenuous year.

May the highly developed experience of the past prove a guiding star throughout the year 1917.

American Can Company

NEW YORK

CHICAGO HAMILTON, ONTARIO SAN FRANCISCO

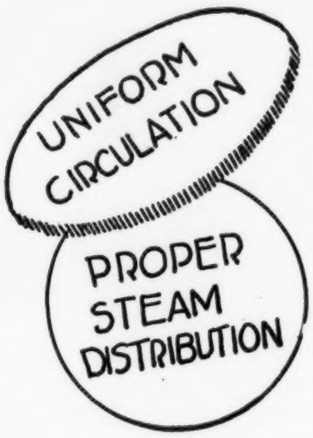
With offices in the largest Cities

"BUFLOVAK" EVAPORATORS

To the Man who knows the value of these features in an Evaporator

"BUFLOVAK" EVAPORATORS

offer definite Saving and Increased Profits.



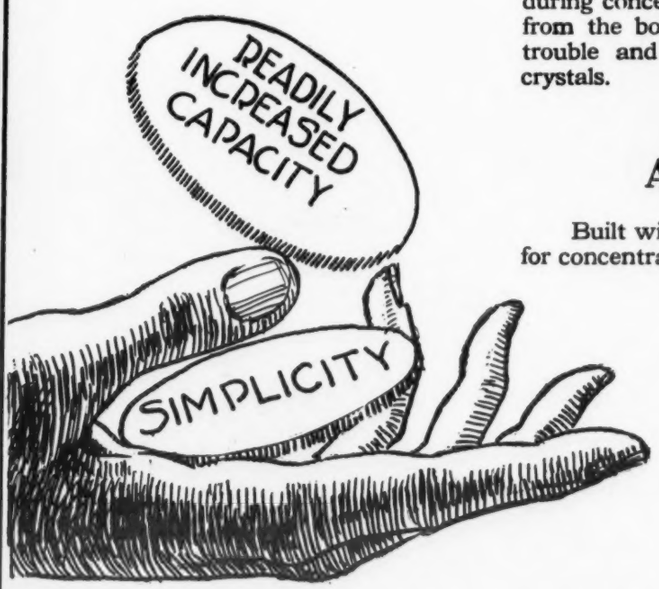
"Buflovak"
Horizontal Tube Evaporator

Designed to meet the most rigid requirements. Can be used economically for liquors which must be handled at low cost. Arranged so that the capacity can be readily increased by merely adding a belt to the shell instead of purchasing a new evaporator.

Built in any size up from 500 sq. ft. heating surface. Smaller evaporators with oval shell down to 36 sq. ft. heating surface.

"Buflovak"
Vertical Tube Evaporator

Designed for liquors containing salts which become insoluble during concentration, thus making it important to remove the salts from the boiling zone as quickly as possible, in order to avoid the trouble and delay caused by the coating of the tubes with salt crystals.



"Buflovak"
All Cast-Iron Evaporator

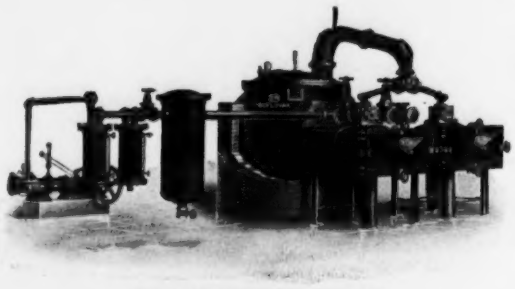
Built with vertical tubes, made of our special grade of cast iron, for concentrating liquors which will destroy charcoal-iron or copper tubes in a short time. Can also be arranged for the separation of salt crystals.

Other apparatus includes Condensers, Vacuum Pumps, Receivers, Salt Filters, Preheaters, etc.

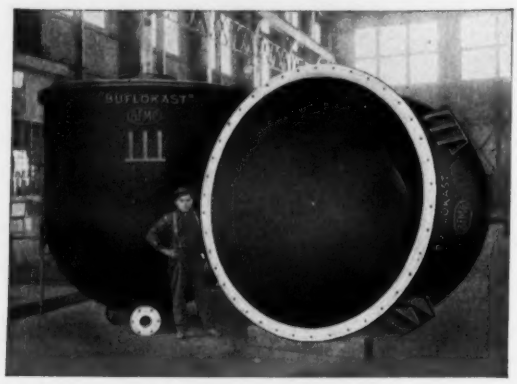
Built for To-morrow's Satisfaction instead of To-day's Price.

BUFFALO FOUNDRY & MACHINE CO.
4 WINCHESTER AVE. BUFFALO, N.Y.
NEW YORK OFFICE—17 BATTERY PLACE

"BUFLOKAST" CHEMICAL PLANTS



BETA-NAPHTHOL STILL



NITRIC ACID RETORTS

IN the great work of building up American chemical industries "Buflokast" equipment has had a notable part, in making it possible for American chemical manufacturers to meet the many new problems and conditions which confronted them. The success of "Buflokast" equipment was largely due to our engineering, our consulting specialists, our facilities and our past experience in industrial chemistry, which enables us to produce designs that insured satisfactory service from the start.

No hit-or-miss experimenting was necessary.

The principles behind "Buflokast" are few and simple — just *efficiency* and *durability* — which mean lowest cost in the end. "Buflokast" Apparatus stands squarely on its record, a record that includes numerous replacements of other apparatus with "Buflokast" equipment. If you insist on dependability and service in your chemical plant, your choice is bound to be "Buflokast."

Our organization, our engineering, our manufacturing facilities, our consulting specialists — these are all at your command for the solution of YOUR chemical problems.

"Buflokast" equipment includes complete chemical plants and individual pieces of apparatus used in the production of Organic and Heavy Chemicals, Acids, Alkalies, High Explosives, Coal-Tar Colors, and kindred materials.

Nitrators, Reducers, Sulphonators, Aniline, Beta-Naphthol and Phenol Stills, Autoclaves, Caustic Pots and Fusion Kettles, Nitric Retorts, Crystallizers, Acid Eggs, etc. Also Special Chemical Apparatus.

"BUFLOVAK" VACUUM DRYERS

The reputation of "Buflovak" dryers is based on sound, conservative, yet thoroughly up-to-the-minute principles. Every essential element for drying your materials economically and with absolute uniformity are embodied in their construction.

The Vacuum Drum Dryer shown in the cut is the ideal apparatus for converting liquids into a dry powdered form. It will handle the most delicate liquid materials without the slightest danger of overheating and at a very low cost of operation. In most cases the dried material is delivered as a powder, thus eliminating the use of grinders.

It is the same with our Shelf and Rotary Dryers — each with their own points of superiority, making them the kind that insures both *quality* and *quantity* of output.

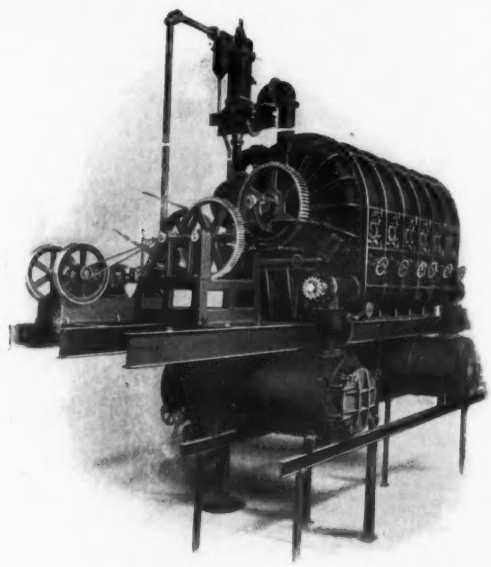
"Buflovak" Dryers are built for all materials and to suit any capacity

Vacuum Drum Dryers for liquids containing solids.

Vacuum Shelf Dryers for drying materials in pans or trays.

Vacuum Rotary Dryers for materials that permit being mixed or tumbled while drying.

Dry Vacuum Pumps, Condensers, Solvent Reclaiming, Impregnating and Special Vacuum Apparatus.



VACUUM DRUM DRYER

BUFFALO FOUNDRY & MACHINE CO.

4 WINCHESTER AVE. BUFFALO, N.Y.

NEW YORK OFFICE — 17 BATTERY PLACE

FLOWERS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Arnica, lb	1.20@1.50	60@65	70@—	80@—	34@36	28@30	20@22	18@19	16½@17½	12@12½
Borage	80@90	90@1.00	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.40@1.50	95@1.00	95@1.00	—@—
Calendula, German	1.00@—	1.00@—	75@—	75@—	45@60	40@50	35@40	35@38	55@60	40@43
Chamomile, Roman	48@50	50@52½	39@40	32@35	30@32	30@32	35@38	38@40	45@—	15@16
Hungarian	55@60	*55@60	70@75	70@—	60@65	60@65	55@65	30@40	28@30	35@—
Italian	35@40	35@40	58@60	65@70	45@48	45@48	—@—	—@—	—@—	—@—
Clover tops	24@30	14@18	18@20	14@16	14@16	11@12	11@12	11@12	10@12	8@9
Elder	25@30	15@16	18@20	14@16	16@18	13@14	13@14	10@17	16@17	11@13
Insect, open	*50@—	*50@—	*50@—	*50@—	*50@—	*50@—	*50@—	nominal	22@24	18@20
closed	*55@—	*55@—	*55@—	*55@—	*55@—	*55@—	*55@—	nominal	32@34	32@34
powdered, flowers and stems	22@30	26@28	26@28	26@28	26@28	26@28	26@28	26@28	24@26	14@16
powdered, flowers	40@43	40@45	40@45	40@45	40@45	40@45	40@45	35@40	28@40	22@40
Kusso	*55@60	55@60	*55@60	*55@60	*55@60	*55@60	50@55	50@55	50@55	50@55	—@—
Lavender, ordinary	16@18	16@18	20@22	20@22	16@18	16@18	18@19	21@23	21@23	20@22
select	22@30	22@30	25@30	25@30	20@22	20@22	22@28	32½@35	32½@35	28@31
Linden, with leaves	35@40	35@40	55@60	40@50	40@50	40@50	45@55	50@60	40@50	35@—
Malva, blue	1.20@1.25	1.20@1.25	1.50@1.75	1.50@—	1.50@—	1.50@—	1.50@—	1.00@—	50@—	—@—
Mullein	*3.00@—	*3.00@—	*3.00@—	*3.00@—	2.50@—	2.00@—	1.00@—	1.60@1.65	1.00@—	—@—
Orange	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	—@—
Poppy, red	50@55	50@55	45@50	45@50	40@45	35@—	35@—	35@—	35@—	40@45
Saffron, American	75@80	1.40@1.45	1.75@1.85	1.35@1.40	1.25@—	60@65	75@—	32@33	35@38	44@47
Valencia	11.40@11.50	11.00@11.25	10.75@10.80	11.00@11.25	11.15@11.50	11.25@11.50	11.75@12.00	12.00@12.25	11.75@12.00	11.50@11.75

HERBS AND LEAVES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Aconite, lb	15@16	15@16	15@16	12@14	9@10	8@9	7@10	7@10	7@10	7@8
Bay, true	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	nominal	nominal	10@15
Boneset	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6	5@6
Buchu, short	1.18@1.20	1.20@1.25	1.18@1.20	1.30@1.35	1.25@1.30	1.05@1.10	1.15@1.20	1.45@1.50	1.45@1.50	1.40@1.45
long	1.25@—	1.25@—	1.30@1.35	1.30@1.35	1.20@1.30	1.00@1.05	1.17@1.19	1.28@1.30	1.30@1.35	1.30@1.35
Belladonna	1.50@1.75	1.50@1.75	1.85@2.00	1.75@2.00	1.35@1.40	1.00@1.05	85@90	1.30@1.60	1.50@—	50@55
Cannabis indica, tips	80@2.60	2.75@—	2.75@—	2.10@2.20	1.90@2.00	1.75@1.80	1.80@1.85	1.60@1.70	1.60@1.70	1.55@1.65
Chiretta	30@32	30@—	22@24	22@24	14@15	14@15	18@—	18@—	18@—	14@16
Coca, Truxillo	35@40	35@40	35@40	35@40	35@40	35@40	35@40	35@40	35@40	25@—
Coltsfoot	20@22	20@22	60@—	60@—	25@50	35@40	20@22	15@20	15@20	6@6½
Conium	20@—	20@—	20@—	20@—	14@20	10@11	10@11	10@11	10@11	6@6½
Corn silk	8@11	—@—	9@10	12@14	10@11	10@11	10@11	7@8	9@10	—@—
Damiana	13@14	12@13	13@13½	9¼@10	8@11	7½@8	8½@9	8@8½	8@8½	8@9
Deer tongue	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8	7½@8
Digitalis, Austrian	55@60	55@60	85@90	90@95	55@70	20@25	25@—	25@27	14½@15	7½@8½
Eucalyptus	7@7½	6@7	6@7	5@5½	5@5¼	7@9	7@9	7@9	7@9	4@4½
Euphorbia pilulifera	22@23	24@25	27@28	40@45	40@45	40@45	40@45	40@45	40@45	14@15
Grindelia robusta	7@8	6½@8	7@8	8@9	5@6	5@6	5@6	5@6	5@6	5@6
Henbane, German	Nominal	Nominal	nominal	*85@95	*30@—	22@24	22@24	22@24	—@35	15@19
Russian	3.25@3.50	1.35@1.40	1.40@1.50	*95@1.00	*30@35	8@20	18@20	20@22	15@20	7@9
Henna	11@12	11@12	11@12	12@14	12@14	12½@13	14@15	14@15	14@15	13@14
Horehound	20@22	18@20	30@31	25@—	17@18	12@14	11@12	9@10	9@10	6¾@7
Jaborandi	18@20	18@20	18@20	18@20	18@20	18@20	18@20	18@20	18@20	14@15
Laurel	6@6¼	5¾@6¼	5¾@6¼	6@6½	6@6¼	6@6½	6@6¼	6@6½	5@5½	3¾@3¾
Liverwort	50@60	23@25	23@25	23@25	20@21	16@17	16@17	16@17	30@40	—@—
Lobelia	7½@8½	7½@8½	8@9	8@9	7½@9	7¾@9	7@8	7@8	7@8	9¼@10
Matico	25@30	23@30	35@36	35@36	—@30	—@30	25@—	25@—	20@—	25@30
Marjoram, German	*50@55	45@52	40@43	40@42	38@42	33@40	28½@40	30@35	28@41	18@21
French	27½@28	19¼@20	16½@17	14@14½	14½@15½	13@13½	12½@13¾	11½@12	12½@12¾	10@10½
Pennyroyal	5@6	5@6	5@6	5@6	4@5	4@5	4@5	4@5	4@5	4@5
Peppermint, American	14@16	14@16	16@18	16@18	12@14	12@14	12@14	12@14	12@14	11@12
German	35@40	35@40	35@40	35@40	35@40	35@40	35@40	35@40	42@45	42@45
Pichi	10@11	12@14	12@14	12@14	8@10	8@10	11@12	11@12	11@12	12@13
Pulsatilla	Nominal	4.00@5.00	4.00@5.00	4.00@5.00	3.00@—	1.25@1.50	1.25@1.50	1.25@1.50	nominal	30@35
Prince's pine	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10
Rose, red	1.35@1.50	1.40@1.65	1.00@—	1.60@—	1.75@—	1.75@—	1.70@1.80	1.75@2.00	1.75@2.00	1.75@2.00
Rosemary	12@13	6@7	6@7	6@7	5½@—	6@6½	6@6½	4½@5	4½@5	3@4
Rue	40@50	40@50	40@50	40@50	40@50	40@50	40@50	40@50	40@50	8½@9
Sage, Austrian, stemless	*65@70	*50@55	50@55	50@55	50@55	34@35	29½@31	21½@22½	12½@13	4@4¼
grinding	*65@70	*45@50	41@45	43@45	39@42	3 ½@33	27½@28½	17½@18½	11¼@11½	3@3½
Greek	8@8½	8½@9	10¾@11¼	10@10½	12½@13	10¼@11	—@—	—@—	—@—	—@—
Spanish	7½@8	8@9	10@11	10¼@11	10½@11	12@14	—@—	—@—	—@—	—@—
Savory	*20@25	17¼@17¾	20¼@21½	19½@20	20¼@21	13@14	8@10	7¼@8	9¾@10	3¾@4¼
Sidritis, cut	14@16	14@16	14@16	14@16	14@16	14@16	14@16	11@16	14@16	—@—
Skullcap, U. S. P.	15@16	15@16	15@16	15@16	22@22½	22@22½	22@22½	22@22½	22@22½	20@22
Senna, Alexandria, white	65@70	60@75	75@80	55@57	45@50	40@45	45@48	35@40	50@—	35@38
half leaf	55@60	55@60	65@70	42@45	40@45	30@32	32@35	30@35	40@45	30@33
siftings	40@42	43@45	46@55	25@—	19@20	17@18	13@18	16@18	22@25	13@16
Tinnevelly	17@27	22@30	27@37	17@30	20@25	25@—	16@24	17@25	9@12	6@11
pods	30@35	30@35	22@25	17@18	12@14	7@8	7@8	8@10	8@10	5@6
Spearmint, American	20@22	20@22	20@22	18@20	18@20	18@20	20@25	20@23	20@25	15@25
Squaw vine	11@13	8@10	8@10	8@10	8@10	8@10	10@12	8@—	10@12	8@9
Stramonium	19@20	18@18½	21@23	28@30	22@23	16@20	22@25	18@21½	16½@18	7½@8½
Tansy	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	—@—
Thyme	10½@11	11¼@11½	11½@12	12¾@13¾	13½@14	7¾@8¼	6¾@7	6½@7¾	6¼@7	4¾@5
Uva Ursi	5¾@6¼	5¾@6¼	6¼@7	7½@8½	7@8	7@8	5½@9	5½@6	5½@6	3½@4
Witchhazel	5½@6	4@5	4@5	4@5	4@5	4@5	4@5	4@5	4@5	5@6½
Wormwood, foreign	19@20	25@30	15@17	15@17	5½@6	5½@6	5½@6	5½@6	5¼@6	7@7½
Yerba Santa	7½@8½	7½@8½	7½@8½	7½@8½	7½@8½	6@7	6@7	6@7	6½@7	8@9

ROOTS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Aconite	*75@80	65@70	50@75	50@75	18@20	14@16	13@15	13@15	13@15	11@12
Alkanet	*85@90	75@80	80@—	*75@—	*75@—	28@30	18@20	15@20	19@20	6@6½
Althea, whole	35@40	30@32	50@55	50@—	40@—	30@—	30@—	25@30	25@30	16@18
cut	42@44	42@44	55@60	55@1.50	50@55	45@—	40@45	50@55	30@32	22@24
Angelica, German	*30@35	15@20	20@25	15@20	15@20	15@20	15@20	15@20	60@—	18@20
American	30@35	14@16	14@16	14@16	14@16	14@16	14@16	20@—	20@—	15@16
Arnica, Montana	50@60	55@65	60@75	60@75	35@40	35@40	35@40	40@42	40@42	40@45
Arrowroot, Bermuda	50@52	42@45	42@45	42@45	42@45	42@45	42@45	42@45	42@45	45@50
St. Vincent, bbls	7@8	6¾@7	7@7½	6¼@6½	6¼@6½	6¼@6½	6¼@6½	7@7½	8@8½	8@9
Belladonna, Atropa	2.75@5.00	2.75@5.00	2.25@2.50	2.00@—	2.00@—	1.75@2.00	1.25@—	1.25@—	1.00@1.10	10@11
Berberis aquifolium	12@13	10@11	9¼@10	10@11	10@11	9@10	9@10	9@10	9@10	11@12
Beth	15@20	20@25	20@25	20@25	20@25	20@25	25@—	20@—	20@—	—@—
Bitter	22@24	22@24	22@24	22@24	22@24	22@24	24@28	24@28	24@28	24@28
Blood	11@12	9@9½	9@9½	9@9½	9@9½	9@9½	9@9½	9@9½	9@9½	9@9½
Bluenag	12@14	12@14	12@14	12@14	11@12	11@12	11@12	12@13	12@13	13@15
Bryonia	40@50	40@50	1.20@1.50	1.20@—	24@26	22@24	22@24	12@13	10@12	12@—
Burdock	21@23	25@40	40@—	40@—	25@—	17@—	12@14	9@10	7½@10	7@8
Calamus, bleached	2.50@3.50	2.00@2.50	2.00@2.50	1.00@2.50	*1.25@—	55@60	50@55	35@40	40@—	23@25
unbleached	25@26	22@25	22@25	22@25	22@25	20@25	15@18	15@16	14@15	9@10
Cohosh, black	4½@5	4½@5	4½@5	4½@5	4½@5	4½@5	5@5½	5@5½	5@5½	4@4½
blue	4½@5	4½@5	4½@5	4½@5	4½@5	4½@5	5@6	5@6	5@6	5@6
Colchicum	2.00@2.10	2.00@2.10	2.00@2.10	1.30@—	22@25	22@25	20@22	15@16	15@16	11@12
Colombo	12@12½	10@11	13@14	25@28	7@8	7@8	7½@8½	6@8	6@8	6@7
Culvers	11@12	9@10	9@10	9@10	9@10	9@10	14@16	14@16	14@16	14@17
Dandelion, German	30@32	32@36	35@—	30@35	30@35	22@24	22@25	20@22	20@25	10½@11
Doggrass	1.45@1.50	1.40@1.50	1.40@1.50	1.40@1.50	85@—	60@—	45@60	25@30	15@18	6¼@7
Echinacea	55@65	30@35	20@21	17@18	17@18	17@18	17@18	17@18	17@18	22@24
Elecampane	9@10	11@12	11@12	15@16	15@16	7½@7¾	7½@8	7½@8	7½@8	6¼@7
Galangal	10@10½	10@10½	15@16	9@10	9@10	9@1	12@12½	12@12½	25@38	8@9
Geranium	6@7	6@7	6@7	4@5	4@5	4@5	4@5	4@5	4@5	4@5
Gelsemium	5@6	4½@5	4½@5	4½@5	4½@6	4½@5	5@6	5@6	5@6	5@6
Gentian	13@14	18@20	25@26	28@29	18@—	8½@9	8¾@9½	8¾@9	7½@8½	6½@6¾
Ginger, Jamaica, unbleached	17@20	16@19	17@18	17@18	20@—	12@13	12@13	12@13	12@13	8@11
bleached	21@22	21@22	22@24	22@24	22@24	17@18	16@18	16@18	18@20	15@16
Ginseng, wild, Southern	6.25@6.50	6.25@6.50	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	6.00@6.25
Northwestern	6.50@6.75	6.50@6.75	7.25@7.50	7.25@7.50	7.25@7.50	7.25@7.50	7.25@7.50	7.25@7.50	7.25@7.50	6.25@7.00
Eastern	6.25@6.50	6.25@6.50	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	6.25@7.00
cultivated	4.25@5.50	4.25@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50	5.00@5.50
Golden seal	5.00@5.10	5.50@5.65	4.40@4.50	4.50@5.00	4.50@5.00	4.25@4.35	4.50@4.60	4.85@5.00	4.20@4.30	4.50@4.75
powdered	5.50@5.75	5.65@6.00	4.75@4.80	4.70@4.80	4.70@4.80	4.65@4.75	4.75@4.90	5.00@5.15	4.55@4.60	5.15@5.25
Hellebore, white	40@45	40@45	38@40	35@—	—@10	—@10	—@10	—@10	—@10	9@10
black	35@40	15@18	15@18	11@12	11@12	11@12	11@12	11@12	6@8	6@6½
powdered, white	20@23	23@24	26@30	35@40	20@25	12½@13	13@14	12@13	12@13	10@11
Ipecac, Cartagena	2.25@2.50	1.85@2.00	2.05@2.15	2.70@2.75	3.25@3.50	2.00@2.25	2.50@3.00	1.75@—	1.95@2.00	1.42½@1.45
Rio	3.00@3.25	3.00@3.50	3.75@4.00	*4.00@—	*4.00@—	*4.00@—	*5.00@—	3.10@3.15	nominal	2.00@2.10
Jalap	12@13	10@12	11¼@15	10@12	8¾@9½	9@10	8@10	9½@10	10@11	12@18
Kava kava	20@22	18@20	18@20	18@20	18@20	18@20	24@25	24@25	24@25	18@20
Lady slipper	38@40	35@—	28@30	23@25	33@35	33@35	33@35	33@35	24@25	24@25
Licorice, Spanish, in bales	16@18	15@20	22@27	*20@—	*12@13	*12@13	*12@13	6@7	5@7	4½@5½
selected	25@26	25@26	22@27	25@—	15@16	14@15	13@14	13@14	12@14	9@11
Lovage, American	50@55	50@55	50@55	35@40	35@40	35@40	65@70	35@38	35@38	30@50
German	30@35	30@35	30@35	25@30	25@30	25@30	25@30	—@—	—@—	22@25
Manaca	23@25	30@40	30@40	25@40	40@50	40@50	40@50	60@70	60@70	60@70
Mandrake	7½@8	7@7½	7@8	7@8	8@10	8@10	8@10	8@10	8@10	11@13
Musk, Russian	2.75@3.00	2.00@—	2.00@—	2.00@—	1.25@—	90@95	90@95	40@42	40@42	12@13
Orris, Florentine, bold	16@17	16@17	12@12½	15@16	15@16	15@16	15@17	17@19	17@19	19@20
small	14@15	14@15	11@12	14@15	12½@13	12@12½	13@14	13@14	14@15	17@18
Verona	12@14	12@14	10@11	11½@12½	11½@12½	10¼@11	11½@12½	12@13	12@13	14@15
fingers	1.50@1.75	1.50@1.75	1.75@2.00	*2.50@3.00	1.50@1.60	65@1.00	75@1.00	75@1.00	—@—	75@—
Pareira brava	33@38	30@35	25@30	16@18	12@14	12@14	16@17	16@17	20@22	14@16
Pellitory	35@38	35@58	35@38	30@—	30@—	30@—	30@—	30@—	20@22	20@22
Pink, true	33@35	36@38	36@38	36@38	40@50	40@50	40@50	40@50	40@50	65@75
Pleurisy	20@22	12@13	12@13	12@13	12@13	14@20	14@20	14@20	14@20	15@16
Poke	5@6	5@6	5@6	5@6	5@6	5@6	5@6	7@8	7@8	5½@6
Rhatany	20@25	30@35	75@—	80@—	60@70	32@35	14@15	9@10	10@12	11@12
Rhubarb, Shensi	80@82½	80@82½	80@82½	80@—	80@—	8@—	80@—	80@—	80@—	80@—
high dried	19@22	17@18	20@21	22@—	13½@14	13¾@14	14@15	15@—	17@19	15@16
cuts	40@1.65	60@1.65	60@1.65	22@—	18@19	18@19	18@19	19@20	19@20	19@20
Sarsaparilla, Honduras	38@39	38@39	38@39	40@45	40@45	40@45	40@45	42½@45	48@50	65@70
Mexican	14@15	10½@11	12¼@13	11@12	12@13	13@14	15@16	9@10	10@12	30@32
Senega, Northwestern	65@70	62@65	41@42	45@50	45@50	35@37	42@45	40@45	38@40	50@60
Southern	68@73	50@60	60@—	60@—	60@—	60@—	60@—	60@—	45@50	60@—
Serpentaria	32@35	32@35	32@35	35@38	35@38	35@38	38@42	38@42	38@42	42@44
Skunk cabbage	10@12	10@12	10@12	10@12	10@12	10@12	10@12	10@12	10@12	10@12
Snake, Canada	24@26	18@30	20@25	28@30	24@30	28@30	28@30	20@22	20@22	14@30
Spikenard	11@13	10@12	10@12	10@12	10@12	10@12	10@12	10@12	10@12	10@12
Squills, white	12@14	13@15	18@20	20@22	6½@7	5¼@5¾	4½@5	4½@5	4¾@5¾	4½@4½
Stillingia	6@7	5@7	5@7	5@7	5@6	5@6	5½@6	5½@6	5½@6	6@7

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	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Stone	5@8	6@7	6@7	6@7	6@7	6@7	6@7	6@7	6@7	6@7
Unicorn, false	35@37	32@34	32@34	40@42	41@43	42@45	45@46	60@65	90@1.00	50@55
true	18@21	19@21	18@20	21@23	21@23	22@23	22@23	30@32	38@40	26@30
Valerian, Belgian	80@—	80@—	70@75	*65@70	30@32	28@30	13@15	11½@12	11¼@12	7@7½
English	*70@75	*70@75	*70@75	*70@75	70@75	70@75	70@75	70@75	70@75	25@30
Wild yam	6@6½	6@6½	6@6½	6@6½	6@6½	6@6¼	6@6½	6@6½	6@6½	6@6½
Yellow dock	12@14	10@12	12@16	7@7½	6@6½	6@6½	7@8	7@8	7@8	6@7
Zodeary	12@14	15@—	15@—	10@—	10@—	10@—	10@—	10@—	5@10	4½@5

* Nominal.

SEEDS, SPICES AND WAXES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Anise, Spanish, lb	21½@22	17@18¼	13½@14	14¼@14¾	12¾@13½	11½@12	12@13	12¼@12¾	11¼@12	10@10½
star, actual weight	23@24	22@24	24½@25	25½@26½	*27@30	24@25	20½@21	20½@21	20½@21	19¼@19¾
Levant	*18@19	12½@13	12¼@13	12¼@13	11@11½	11@11½	11@11½	10¾@11¼	—@—	*—@—
Italian	21@22	17@18¼	—@—	—@—	—@—	—@—	—@—	—@—	—@—	12@12½
Canary, Spanish	5¼@6	5¼@5½	5¾@6¼	5¾@7	5½@5¾	5½@5¾	6¼@6¼	6½@7	6½@7	—@—
Smyrna	7½@8	*7@—	*7@—	*7@—	5¾@7	5¾@7	6¼@6¾	7@7½	7¼@8	6@6¼
South American	5¾@5¾	4@4¼	4½@5	5¼@6	4¾@5¼	4¾@5¼	4¾@5	6@6¼	6¼@7	6@6½
Dutch	5¼@6	5@5½	5@5½	5¼@5½	4½@6	6@6½	5½@6	6¼@6½	6@6½	—@—
Caraway	51@53	26¾@27¼	18¼@18¾	16¼@16½	12¾@13	9¾@10½	10@10¼	9¼@9½	8¾@9¼	8@8¼
Cardamoms, bleached	80@1.35	85@1.30	85@1.30	85@1.30	85@1.40	95@1.50	1.20@1.50	1.05@1.50	1.30@1.50	1.30@1.75
decorticated	65@70	68@72	68@72	75@80	75@80	85@95	1.15@1.25	1.15@1.25	1.15@1.25	1.15@1.30
Celery	18½@19	22@24	22@23	34@35	30@31	33@34	16¾@19	18@18¼	14@15	17¼@18
Colchicum	1.05@1.75	1.25@1.30	1.05@—	1.05@—	95@1.00	85@1.00	85@1.00	55@60	80@90	20@21
Conium	18@20	18@20	18@20	18@20	10@15	10@15	10@15	9@9½	9@9¼	9@10
Coriander, natural	15½@16	9¼@10	5½@6	6@7	4¼@4¾	4¾@5	3½@5¾	4¼@4½	4@4¼	4¼@6
bleached	16½@17	10¾@11	6¼@7	7@7¼	5¼@6	5¼@6	4¼@5	5@5½	4½@5½	5@6
Cumin, Malta	21½@22	*20@21	*23@24	*23@24	*23@24	nominal	23@24	22¼@23	13¾@14¼	10@11
Mogador	21½@22	21@22	22¼@23	—@—	—@—	20¼@21	23@24	—@—	—@—	—@—
Dill	20@21	15½@16	9@10	8@8½	6½@6¾	6½@6¾	8@9	7¾@8¼	7¼@7¾	7¼@8
Fennel, German, large	60@65	60@65	75@—	75@—	1.00@—	40@—	35@40	28@30	18@19	10@12
small	*22@—	20@—	20@—	20@—	16@20	16@20	16@20	12@14	12@14	8@8½
French	16@18	11½@12	15¼@15¾	14@—	12@13	8@—	8@—	7¾@8	10¼@11	—@—
Roumanian	*18@20	18@20	18@20	18@20	15@17	15@17	11@12	15@17	15@17	nominal
Flax, whole, bbl	11.00@11.50	9.75@10.00	8.75@9.00	8.50@8.75	8.50@8.75	8.25@8.50	8.25@8.50	8.25@8.50	8.25@8.50	10.00@10.25
Foenugreek	7½@8	7@7½	4¼@5	4@5	3¼@4	3@3¼	3@3½	8@3½	5@6	3@3½
Hemp, Manchurian	6½@7	6@6¼	4¼@5	4¾@5¼	5½@5¾	3¼@3¾	2¾@3	nominal	nominal	2¼@3
Russian	*6½@—	*6½@—	*6½@—	*6½@—	*5@5¼	nominal	3@3¼	3¾@4	3¼@4	2¼@3
Job's tears, white	8@10	6@7	6@7	6@7	6@7	6@7	6@7	6@7	5@6	—@—
Larkspur	23@25	20@21	21¼@22	25@28	25@28	25@30	28@30	28@30	28@30	25@30
Lobelia	22@24	27@28	27@28	22@25	22@25	30@35	30@35	30@35	30@35	25@27
Millet, natural	3.50@3.60	3.00@3.15	3.20@3.40	3.30@3.50	3.00@3.10	2.90@3.00	2¾@3¼	2¾@3¼	2¾@3¼	1.90@2.20
hulled	*7¼@7¾	6½@7	6¼@7	6¼@7	6¼@7	7@7½	8¼@9	9¾@10½	9¾@10¼	4¼@4¾
Mustard, Bari brown	14@14½	14@14½	15@16	16@17	11¼@12	7¼@8	8@9	8¼@9	8¼@8¾	6@6¼
California, brown	12½@12¾	11¼@12	15@16	15@16	12@12½	9¼@10	9@9½	10@10¼	8¼@8¾	5@5½
Sicily, brown	14¼@14¾	13¼@14	15@16	16@16½	12½@13	7¼@7¾	7¼@8	10@11	7¾@8½	5¾@6¼
Trieste, brown	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—	6@6½
English, yellow	13½@14	12¼@12½	16¼@17	19¼@19¾	13½@14	11½@12	10¼@10¾	11@12	7½@8	6@6¼
Dutch, yellow	13½@14	14¼@14½	16@17	19@19½	13¼@13¾	—@—	—@—	—@—	—@—	—@—
Parsley	21@22	21@22	21@22	21@22	21@22	21@22	21@22	21@22	25@—	20@21
Poppy, Dutch	*40@42	20@30	28@30	32½@33½	24½@25	15¾@14¼	13½@14	14¼@14¾	13½@14	6¼@6¾
India	*35@38	26½@27	30@32	32½@33½	—@—	—@—	—@—	—@—	—@—	—@—
Russian	*35@38	27½@28	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Pumpkin	11@11½	11@11½	11@11½	11@11¾	11@11½	11@11½	11@11½	11@11¼	12@15	12@15
Quince	75@80	75@80	75@80	75@80	70@75	70@75	75@80	75@80	65@70	60@70
Rape, English	9@9½	9@9½	9@9¼	9@9¼	9@9¼	9@9¼	9@9¼	9¼@10	6¾@7¼	5¾@6¼
Bulgarian	8¾@9½	8¾@9¼	8¾@9¼	8¾@9¼	8¾@9¼	8¾@9¼	—@—	8¾@9¼	—@—	—@—
Japanese	6@7	5¾@6¼	6¼@7	6¼@7	6¼@7	6@6¼	—@—	—@—	—@—	—@—
Sabadilla	24@25	22@24	22@24	20@21	20@21	19@21	19@21	18@20	22@24	15@16
Stavesacre	30@34	30@34	45@—	90@—	25@—	25@—	25@—	20@—	20@—	10¼@11
Stramonium	10@12	10@—	10@—	10@—	10@—	10@—	10@—	10@—	10@—	8@8¼
Strophanthus Kombe	2.25@—	2.25@—	nominal	*2.00@2.50	60@—	60@—	60@—	60@—	60@—	40@42
Hispidus	Nominal	Nominal	nominal	*2.00@2.50	50@55	50@55	45@50	45@—	50@—	38@40
Sunflower, large	5¼@6	5½@6	5¼@6	9¼@11	9¼@11	9¼@11	10@10½	10¼@11	7¼@7½	4@4¼
small	4¼@5¼	4½@5½	5@6	6@7¼	6@7¼	6¾@7¼	6¾@7¼	8@9	5¾@6¼	3¼@4
Worm, Levant	65@75	85@90	1.00@—	1.00@—	1.30@1.50	1.30@1.50	1.50@—	60@65	55@65	35@38
American	6@10	9@10	9@10	9@10	9@10	9@10	10@11	10@11	10@11	9½@10

SPICES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Cassia, Batavia, No. 1	21¼@22	20@21	23@24	26@27	20@21	18¼@19	18¼@19	19¼@20	19@20	18@19
shortstick	17@18	16@17	19@20	23@24	*17@18	12¼@13	12@13	12@13	12@13	11@12
Batavia, No. 2	15@16	15½@16	18@20	*21@22	*18@20	12@13	12@13	12@13	12@13	10@11
No. 1 Saigon rolls	44@45	40@41	51@62	65@70	58@60	33@34	33@34	31@32	31@32	28¼@29
China, cases	12¼@13	12¼@13	14@15	17@18	12¼@12¼	8¼@9	8@8¼	9@9¼	8@8¼	7¼@7¾
broken, extra	9¾@10	8¾@9	11@12	16¼@17	11@12	6@6¼	6@6¼	6¼@6½	6@6¼	5¼@5¾
buds	14½@15	15@16	15@16	19@20	17@17½	13@13½	13@13½	12¼@14	12¼@14	11¾@12
Chillies, Japan	17@18	22@23	28@29	31@32	35@36	33½@34	27@28	27@28	19½@20½	14@14½
Mombassa	30@31	31@32	34@35	40@42	35@36	26@27	27@28	27@28	21@22	14¼@14½
Cinnamon, Ceylon, No. 1	24@25	25@26	28@29	29@30	23@24	22@23	21@24	28@20	28@20	30@31
No. 2	22@23	24@25	26@27	27@28	21@22	19@20	21@22	26@27	26@27	29@30
No. 3	21@22	23@24	25@26	26@27	20@21	18@19	20@21	24@25	24@25	28@29
Cloves, Amboyna	25@27	26¼@27	26@27	26@27	*40@—	—@—	—@—	—@—	—@—	26@26½
Zanzibar	19½@20	18@18½	16¼@17	18@19	20@21	15¼@15¾	15¾@16	17¾@18	17¼@17½	15¼@15¾
Penang	32@33	35@38	35@38	36@37	34@35	34@35	34@35	34@35	34@35	28¼@29
Ginger, Cochin, A, B, C	11@11½	10@11	11¼@11¼	11¾@12	9@9¼	8@8½	8@8½	7¾@8	7@7¼	6¼@6¾
Cochin D	10½@11	11¼@11½	11¼@11½	11@11¾	9@9¼	7@7¼	7¼@7½	6¼@7	5¾@6	5¼@6¼
Africa, No. 1	9¾@10	9¼@9¾	9@9¼	11¼@12	9@9¼	7¼@7¾	7¼@7¾	6¾@7	5¾@6	5@5½
Japan	8¼@8¾	7¾@8	8¾@9	9¾@10	7¾@8	6¾@7	6¼@6¾	8¼@9	7@7½	5¾@5½
Mace, Banda	56@57	63@64	68@70	70@72	64@65	60@61	60@61	63@64	65@66	64@64½
Penang, No. 1	56@57	62@63	70@72	70@72	*62@63	*60@61	60@61	62@63	64@65	61@62
Penang, No. 2	52@54	58@60	59@60	59@60	52@53	51@52	51@52	53@54	53@54	56@57
Batavia, No. 2	50@51	51@52	55@56	55@58	45@46	44@45	45@46	49@50	47@48	49@50
Nutmegs, 105s to 110s	25@26	19½@20	22@23	30@31	18¼@19	13¼@13¾	13¼@13¾	14¼@15	14¼@14½	13¾@13¾
75s to 80s	26@27	24½@25	30@31	40@42	25@26	15¼@15¾	16¼@16½	17@18	16@16½	15@15¼
grinding	24@25	19@20	23@24	30@31	17¼@18½	13¾@14	14@14½	14¼@15	14¼@15	13¼@13½
Paprika, Spanish	18@21	16½@20	16¼@19	16¼@19	15¾@19¾	15¾@19¾	15¾@19¾	6½@20	—@—	26@29
Hungarian	27½@28½	*50@—	*50@—	*50@—	*50@—	*50@—	*20@22	nominal	—@—	16@19
Pepper, black, Singapore	21½@22	17¼@17½	17½@17¾	19¾@20	*16@16½	13¼@13½	13¾@14	14¾@15	11¾@12	11¼@11½
Acheen	21@22	16½@17	17@17½	19¼@19½	*15@15¼	12¾@13	12¼@12¾	14¼@15	11¼@11¾	10¾@11
Aleppy	22@23	18½@19	18¼@19	20¼@21	17¼@18	13½@13¾	12¾@13	14¼@15	13@13¼	11¼@11¾
Lampong	21@21½	17@17½	16¾@17	19¼@19¾	15¼@16	14@14½	14¼@14½	14¼@15	11¼@11¾	10¾@11
Tellicherry	22@22½	18¾@19¼	19@19½	20¼@21	17¾@18	13¼@13¾	12¾@13	15@15¼	13@13¼	11¼@11¾
white, Singapore	23½@24	21¼@22	22@22½	25@26	21@22	18¼@19	20¼@21	24@25	21½@22	18¼@19
Penang	23@23½	21@21½	20¼@21	24@25	19@19¼	17¾@18	19¼@19¼	19¼@18¾	18¼@18¾	16¼@16¾
Pimento	5⅝@5⅞	5¼@5½	4½@4¾	6@6¼	4¼@4¼	3½@3¾	3¾@3¾	4@4½	4@4	4¼@4¼

WAXES.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Bayberry	20½@21½	21@21½	21½@23	24@25	22@24	20@21	21@22	23@24	25@27	27@30
Beeswax, white, pure	45@50	40@50	47@55	47@55	47@55	47@55	42@45	40@42	45@55	47½@50
yellow, crude	33@36	30@34	32@34	32@34	32@34	33@38	30@33	30@37	25@30	39@40
yellow, refined	38@40	35@40	36@39	36@39	36@39	33@37	31@35	31@38	30@38	40@41
Candelilla	23@25	23@25	23@25	25@30	25@30	25@30	25@30	nominal	35@—	22@24
Carnauba, flor	50@52	50@52	50@52	50@52	45@47	45@47	45@47	nominal	50@55	50@51
No. 1	46@47	43@44	44@45	47@49	38@40	38@40	38@40	45@50	45@60	45@46
No. 2, regular	38@39	38@39	38@40	40@43	33@35	33@35	33@35	40@45	40@45	42½@43
No. 2, N. C.	34@35	32@33	32@34	33@35	29@30	29@30	29@30	32@34	38@40	32@33
No. 3	29@30	26½@27	27½@28	28¼@29½	22@23	22@23	24@25	27@28	29@32	33@33½
No. 3, N. C.	29@30	26½@27	27@27½	28@29	22@23	22@28	24@25	25@—	30@33	29@30
Ceresin, yellow	*14@18	10@14	10@14	10@14	10@14	10@14	10@25	10@25	10@25	12@22
white	*20@24	14@16	14@16	14@16	14@16	14@16	15@25	15@25	15@25	14@28
Japan	16@16½	14½@15	15¾@16	17@18	13@—	12¾@13	11¾@12	12¾@15	10½@11	11@11¾
Montan, crude	*30@40	*28@30	*28@30	*28@30	*28@30	*24@26	22@24	16@18	9@10	6¼@7½
bleached	*50@60	—@33	—@33	—@33	—@35	33@35	33@35	nominal	35@40	24@25
Ozokerite, crude, brown	45@60	45@60	45@60	45@60	28@40	28@40	28@40	28@40	28@40	21@25
green	80@90	80@90	80@90	80@90	*60@75	*50@60	32@36	32@36	32@36	25@30
refined, white	*75@80	*75@80	*75@80	*75@80	*55@65	*55@65	30@40	30@40	30@40	25@30
refined, yellow	*60@65	*60@65	*60@65	*60@65	*40@45	*40@45	25@30	25@30	25@30	25@30
Paraffine, crude, 103@105 deg	5½@6	4@4½	4@4½	3¾@4	3¼@3½	—@—	—@—	—@—	—@—	—@—
118@120 deg	5½@6	5@—	5@—	5@—	3¼@4	2½@3	2½@3	2¼@3	3¼@3¼	3¼@3¼
124@128 deg	6@6½	5¼@5½	5¼@5½	4¾@5	3¾@4	3¼@3¾	3¼@3¾	3¼@3¾	3¼@3¾	3¼@3¾
refined, domestic, 118@120 deg	6½@7	6½@7	6¼@7	6@—	3¾@4½	4¼@4¾	4¼@4¾	4¼@4¾	4¼@4¾	4¼@4¾
123 deg	7½@—	7½@—	7¼@—	7@—	4@4½	4¾@5	4¾@5	4¾@5	4¾@5	4¾@5
128 deg	8½@9	8½@9	8½@9	7½@—	4¾@5	5¼@5½	5¼@5½	5¼@5½	5¼@5½	5¼@5½
133@135 deg	9½@12	9½@12	9½@12	9@9½	6@6½	6¼@6½	6¼@6½	6¼@6½	6¼@6½	6¼@6½
140 deg	13@—	13@—	13@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
refined, foreign, 125 deg	*6@7	*6@7	*6@7	*6@7	*6@7	*6@7	4½@4¾	4½@4¾	4½@4¾	4½@4¾
130 deg	*7@8	*7@8	*7@8	*7@8	*7@8	*7@8	5@5¼	5@5¼	5@5¼	5@5¼
135 deg	*8@9	*8@9	*8@9	*8@9	*8@9	*8@9	5¼@6	5¼@6	5¼@6	5¼@6
140 deg	*8½@9	*8½@9	*8½@9	*8½@9	8½@9	*8½@9	8½@9	8½@9	8½@9	6@6¼
Spermaceti, block	24@25	24@25	24@25	24@25	24@25	24@25	24@25	24½@26	24½@26	29@30
cakes	25@26	25@26	25@26	25@26	25@26	25@26	25@26	25½@27	25½@27	30@31

* Nominal.

SUNDRY DRUGS AND MISCELLANEOUS ITEMS.

	1917. Jan. 1.	1916 Oct.	1916 July.	1916 April.	1916 Jan.	1915 Oct.	1915 July.	1915 April.	1915 Jan.	1914. Aug.
Acetanilid, C. P., bbls., lb	48@50	55@60	65@85	2.75@3.00	1.15@1.25	1.00@1.20	65@70	1.00@1.50	31@32	21½@22
Acetphenetidin	22.00@24.00	37.00@38.00	24.00@25.00	25.00@28.00	16.50@18.00	8.00@8.50	4.25@4.50	3.50@4.00	1.25@1.40	80@82½
Acetone	22½@23	22½@23	40@42	45@46	35@40	30@33	25@27	21@23	17@20	10½@11½
Agar agar, No. 1	53@55	54@58	—@—	55@58	55@58	45@50	55@60	50@52	50@52	45@50
No. 2	50@52	52@54	55@58	45@50	45@56	40@45	45@55	45@50	45@60	40@45
No. 3	40@42	45@47	48@50	43@45	43@45	38@38	35@40	37½@42	37½@42	37@40
Agaric, white	*50@80	*50@80	*50@80	*50@80	25@—	25@—	25@—	25@—	25@—	—@—

SINCLAIR REFINING COMPANY

SINCLAIR-CUDAHY PIPE LINE CO.
SINCLAIR OIL & GAS CO.

Producers
Refiners
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PETROLEUM PRODUCTS OF QUALITY

Gasoline
Naphtha
Kerosene
Gas Oils
Fuel Oils
Lubricating Oils
Refined Oils
Paraffine Wax
Road Oils
Asphalt

NEW YORK, U.S.A.
120 Broadway

CHICAGO, U.S.A.
Conway Building

Cable Address: SORCORP

	1917.	1916				1915				1914.
	Jan. 1.	Oct.	July.	April.	Jan.	Oct.	July.	April.	Jan.	Aug.
Alcohol, ethyl, 188 proof, gal	2.70@2.72	2.64@2.66	2.64@2.66	2.64@2.66	2.62@2.64	2.54@2.56	2.54@2.56	2.50@2.52	2.58@2.60	2.48@2.50
190 proof, U. S. P	2.72@2.74	2.66@2.68	2.66@2.68	2.66@2.68	2.64@2.66	2.56@2.58	2.56@2.58	2.52@2.54	2.60@2.64	2.50@2.52
cologne spirits, 190 proof	2.76@2.78	2.68@2.70	2.68@2.70	2.68@2.70	2.66@2.68	2.58@2.60	2.58@2.60	2.54@2.56	2.62@2.66	2.53@2.55
strictly grain, 190 proof	2.78@2.80	2.70@2.72	2.70@2.72	2.70@2.72	2.68@2.70	2.60@2.62	2.64@2.66	2.64@2.66	—@—	—@—
refined, wood, 95 per cent	90@92	70@73	65@68	65@68	56@57	45@47	45@47	45@47	45@47	45@47
97 per cent	95@97	75@78	70@73	70@73	60@62	50@52	50@52	50@52	50@52	50@53
purified	1.35@—	1.10@—	1.00@1.03	1.00@1.03	90@92	80@—	80@—	80@—	80@—	80@—
denatured, 180 proof	64@65	54@56	59@61	59@61	50@52	39@40	38@39	33@35	33@35	33@35
188 proof	65@67	55@57	60@62	60@62	51@53	40@42	39@40	34@36	34@36	34@36
Aldehyde, commercial, lb	1.25@1.50	65@70	65@70	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Almonds, bitter	28@30	28@30	28@30	28@30	28@30	28@30	40@—	40@—	40@—	—@—
sweet	25@30	25@30	25@30	25@30	25@30	25@30	39@—	39@—	39@—	—@—
Almond meal	28@30	28@30	28@30	28@30	28@30	28@30	28@30	28@30	28@30	—@—
Aloin, lb	1.00@1.15	80@82	87@92	87@93	87@93	87@93	85@90	87½@90	80@85	68@70
Ambergris, black, oz	10.00@15.00	10.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00
gray	22.00@28.00	22.00@28.00	22.50@27.50	22.50@27.50	22.50@27.50	22.50@27.50	22.50@27.00	22.50@27.50	22.50@27.50	22.50@27.50
Ammonia, carbonate, domestic, lb	9½@10½	9¼@10½	9¼@10½	9½@10½	8½@9½	8¾@9½	8¾@9	8¾@9	8¾@9	8@8¼
powdered	11½@—	11½@—	10½@11	10½@11	9¼@10	9¼@10	9¼@10	9¼@10	9¼@10	8@8¼
Iodide, U. S. P	4.15@4.20	4.15@4.20	4.15@4.20	4.15@4.20	4.15@4.20	4.15@4.20	3.95@—	3.95@—	—@—	—@—
Amyl acetate, gal	4.50@4.75	4.75@4.85	5.50@—	4.75@5.00	4.50@5.50	3.00@—	2.50@2.75	2.65@—	2.50@2.60	1.55@1.60
Antipyrine, bulk, lb	18.00@20.00	21.00@23.00	30.00@32 00	60.00@65.00	32.00@—	20.00@23.00	9.00@10.00	4.00@4.50	22@24	—@—
Antimony, needle, fine powder	15@17	18@20	25@—	*40@47½	35@—	20@21	25@26	11@—	8@9	7@8
Areca nuts	8@10	8@10	8@10	8@10	8@10	8@10	12@13	nominal	9@10	5@5½
Balm of Gilead, buds, lb	20@22	22@24	22@24	23@—	21@22	21@22	21@22	21@22	21@23	24@25
Barium chlorate	*50@60	*50@60	*50@60	*50@60	10@16½	16@16½	16@16½	16@16½	16@16½	13@13½
nitrate	15@16	15@16	15@16	15@16	15@16	15@16	15@16	12@14	12@14	5¾@6
dioxide	*38@—	*38@—	*22@—	*22@—	*22@—	*22@—	22@—	22@—	—@—	—@—
Bay rum, Porto Rico, gal	1.80@1.85	1.80@1.85	1.80@1.85	1.60@1.65	1.60@1.65	1.53@1.55	1.53@1.55	1.55@1.00	1.52@1.53	1.55@1.60
St. Thomas	2.90@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.90@3.00	2.95@3.00
Benzol, pure, water white, gal	58@60	60@65	80@85	80@91	80@90	80@90	90@1.00	90@1.00	1.00@—	—@—
90 per cent	58@60	65@70	75@—	80@1.00	80@90	85@90	90@1.00	90@1.00	1.00@—	—@—
Beta naphthol, gal	1.00@1.05	1.10@1.20	1.35@1.50	1.50@2.00	1.50@3.00	2.00@—	2.00@—	2.00@—	—@—	—@—
Bismuth, citrate, lb	3.50@—	3.50@—	3.50@—	3.50@—	3.25@—	2.70@2.75	2.70@2.75	2.70@2.75	2.70@2.75	2.50@2.55
salicylate	3.90@—	3.90@—	3.90@—	3.90@—	3.25@—	2.55@2.60	2.55@2.60	2.30@2.35	2.30@2.35	1.60@1.65
subcarbonate	3.40@3.45	3.40@3.45	3.40@3.45	3.40@3.45	3.10@—	2.80@2.85	2.80@2.85	2.80@2.85	2.80@2.85	2.10@2.15
subgallate	2.80@3.00	2.80@3.00	3.00@3.05	3.00@3.05	2.65@—	2.35@2.40	2.35@2.40	2.35@2.40	2.35@2.40	1.65@1.70
subnitrate	2.90@3.00	2.70@3.15	3.10@3.15	3.10@3.15	2.80@—	2.50@2.55	2.50@2.55	2.50@2.55	2.50@2.55	1.80@1.85
Blue mass	60@62	58@60	58@60	1.55@1.57	81@83	72@74	69@71	58@59	57@59	40@45
Borax, crystals, granulated, sks	6¾@7	6¾@7	6¾@7	6¾@7½	5¾@6	5¼@5½	4¾@5¼	4¼@4¼	3¾@4¼	3¾@4¼
powdered, sks	7@7¼	7@7¼	7@7¼	6¾@6¾	6@6¼	5½@5¾	5@5½	4½@4¾	4¼@4½	4¼@4½
crystals, granulated, powdered, bbls	7¼@7½	7¼@7½	7¼@7½	6¾@8	6¼@6½	5¾@6	5¼@5¾	4¾@5	—@—	—@—
Bordeaux mixture, paste	3½@6	3½@6	3½@6	3½@6	3½@6	3½@6	3½@6	3½@6	3½@6	3½@6
powder	7@10	7@10	7@10	7@10	7@10	7@10	7@10	7@10	7@10	7@10
Bromide, ammonium, granular	1.00@1.01	1.00@1.10	2.50@2.51	4.50@4.51	4.50@4.51	3.00@3.01	1.00@1.01	75@73	65@66	49@50
potassium, granular	1.35@1.36	1.35@1.36	3.50@3.51	5.50@5.51	5.50@5.51	2.50@2.51	1.10@1.11	80@81	70@81	39@40
sodium, granular	72@78	80@81	2.00@2.01	3.50@3.51	3.50@3.51	2.50@2.51	90@91	65@66	55@56	45@46
strontium, granular	80@81	80@81	2.50@2.51	3.50@3.51	3.50@3.51	2.50@2.51	90@91	—@—	—@—	—@—
Bromine, technical, bulk	1.40@—	1.40@—	3.00@—	*5.00@6.50	*5.00@6.50	1.50@1.75	*2.00@—	40@45	40@45	30@35
U. S. P	1.50@—	1.50@—	3.50@—	*5.00@6.50	*5.00@6.50	1.50@1.75	2.00@—	—@—	—@—	—@—
Burgundy pitch, domestic	5@5½	4½@5	4½@5	3½@3.00	3½@3	4@5	4@5	7@8	8@9	4@4¼
foreign	25@—	25@—	25@—	12@14	10@12	7@8	7@7½	—@—	—@—	—@—
Caffeine, alkaloid	11.25@11.50	13.00@15.00	17.00@—	13.00@13.50	11.50@12.00	10.25@10.50	4.75@6.00	3.65@4.00	4.25@4.60	3.65@3.75
citrated, lb	7.00@7.25	7.50@8.00	10.50@10.75	6.50@—	6.50@—	5.75@6.25	3.35@3.50	3.10@4.50	—@—	—@—
Calomel, American	1.43@—	1.36@—	1.36@—	3.08@—	1.61@1.62	1.40@1.45	1.35@1.39	99@1.00	88@90	60@66
Calamine	34@—	34@—	34@—	10@—	10@—	10@—	10@—	10@—	10@—	—@—
Camphor, monobromated	2.80@2.85	2.80@2.85	3.65@3.75	4.45@4.50	4.25@4.50	2.50@2.55	1.75@1.85	1.30@1.35	1.30@1.35	1.00@1.10
Cantharides, China	95@1.00	95@1.05	1.00@1.05	1.60@—	1.25@1.35	1.25@1.35	1.25@1.35	1.00@1.05	1.00@1.10	nominal
powdered	1.10@1.15	1.15@1.25	1.25@1.30	1.50@1.60	1.50@1.60	1.50@1.60	1.60@1.70	1.10@1.15	1.15@1.20	1.60@—
Russian	4.00@4.15	4.25@4.50	*9.00@10.00	*6.00@—	4.75@—	3.50@4.00	5.50@6.00	nominal	nominal	2.00@2.10
powdered	4.10@4.25	5.00@5.25	9.00@9.50	*6.00@—	4.75@5.00	3.75@4.00	6.00@6.50	5.50@6.00	4.50@4.75	2.25@2.50
Carbon, bisuiphide	5½@6½	7@8	8½@9	6@15	6@16	6½@7½	6½@7¼	6½@7½	7@8	6½@8
Cassia fistula	12@13	12@12½	10½@11	10@11	9@10	9@9½	10@—	8@6	5@6	6½@7
Castile soap, white, pure	15¾@16¼	15@—	15@—	15@—	13@15	12½@13½	12½@13½	11¼@13½	11¼@13½	11½@12½
Marseilles	14@15	11@12	11@12	11@12	11@12	11@12	11@12	11@12	11@12	8@10
green, pure	14@15	11@12½	11@12½	11@12½	10@12	10@12	10@12	10@12	10@12	8¾@9½
ordinary	10@11	8@10	8@10	8@10	8@10	8@10	8@10	8@10	8@10	6¾@8
Castor oil, No. 1, bbls	18@—	14@—	15@15½	20@30	15@15½	9½@10	10@10½	9¼@10	8½@8¾	8½@8¾
cases	18½@19	14½@15	15¼@16	20@30	15½@16	10@10½	10½@11	10@10¼	9@9¼	9@9¼
No. 3	17¾@—	13½@14	14½@15	20@28	14½@15¼	9½@9½	9¾@10¼	9¼@9½	8¼@8½	8@8¼
Castoreum	—@—	10.00@—	10.00@—	10.00@—	10.00@—	10.00@—	10.00@—	10.00@—	10.00@—	—@—
Chalk, precipitated, light, casks, lb	4½@5¼	4½@5¼	4½@5¼	4½@5¼	4½@5¼	4½@5¼	4½@5½	4½@5½	4½@5½	4@4½
heavy	3¾@5	3¾@5	3¾@5	3¾@5	3¾@5	3¾@5	3¾@5	3¾@5	3¾@5	3@3½
Charcoal, willow, pwd	6@7	4@6	4@6	4@5	5@6	5@6	4@5	4@5	4@5	—@—
Chioral hydrate	1.28½@1.45	1.28½@1.45	1.35@2.10	1.37@2.10	1.37@2.10	2.00@2.10	90@1.00	55@60	55@60	31@43
Chloroform	60@65	50@55	44@50	70@75	60@65	35@—	—@—	30@35	30@35	21@26
Chrysarobin	6.25@6.50	6.25@6.50	6.25@6.50	2.00@2.25	—@—	—@—	—@—	—@—	—@—	—@—
Civet	2.00@2.25	2.00@2.25	2.00@2.25	2.00@2.25	2.00@2 25	2.00@2.25	2.00@2.25	2.00@2.25	2.00@2.25	1.50@2.00
Cocaine, hydrochloride, crystals	4.25@4.50	4.25@4.50	4.25@4.50	4.25@4.50	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	4.00@4.25	2.60@3.10
Cocoa butter, bulk	38@40	40@44	41@42	41½@42	38@38½	28@28½	30@32	29@30	32@35	33¼@35
fingers, boxes	42@48	43@45	42@43	43½@45	38@40	32@34	32½@34	32½@34	28@29	31½@33
Codliver oil, Newfoundland, bbls	72.00@76.00	70.00@80.00	130.00@135.00	115.00@120.00	62.50@65.00	65.00@75.00	40.00@45.00	50.00@55.00	—@—	—@—
Norwegian	115.00@125.00	135.00@140.00	140.00@165.00	120.00@130.00	78.00@85.00	82.50@85.00	50.00@55.00	38.50@40.00	20.50@22.00	17.00@20.00
Collodion, U. S. P	33@38	30@38	33@38	33@38	30@32	28@30	—@—	—@—	—@—	—@—
flexible, U. S. P	39@44	39@44	39@44	39@44	35@40	33@35	—@—	—@—	—@—	—@—
Colocynth apples, Spanish, lb	*50@55	*50@55	*50@55	*50@55	*50@55	*50@55	*50@55	25@30	30@32	18@20
Trieste, whole	25@27	20@22	22@25	22@25	22@25	22@25	25@30	25@30	35@40	19@20
pulp, U. S. P	60@65	60@65	60@75	60@75	60@65	50@75	40@45	45@47	35@40	23@24
Corn syrup, 42 deg	3.21@—	2.81@—	2.31@—	2.21@—	2.20@—	2.12@—	2.42@—	2.36@—	2.22@—	2.21@—
syrup, "P. F."	3.21@—	2.81@—	2.31@—	2.11@—	2.18@—	2.06@—	2.36@—	2.16@—	2.16@—	2.10@—
Corrosive sublimate, crystals	1.29@—	1.28@—	1.28@—	2.78@—	1.53@—	1.35@—	1.27@—	95@—	81@86	51@61
granular, powdered	1.29@—	1.28@—	1.23@—	2.73@—	1.48@—	1.30@—	1.22@—	90@—	81@83	51@57
Cotton, soluble	79@1.00	79@1.00	79@1.00	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Coumarin, refined	11.00@11.25	9.50@10.50	9.75@10.00	8.25@8.50	7.00@7.50	7.50@8.00	5.50@6.50	4.25@6.55	3.20@3.50	3.10@3.35
Cresol, U. S. P., gal	1.36@1.50	1.36@1.50	1.36@1.50	1.15@1.25	1.15@1.25	1.15@1.25	1.15@1.20	90@1.00	1.40@1.50	1.00@1.50
Creosote, wood	2.00@2.25	3.00@3.50	7.00@8.00	*11.50@13.00	*3.00@—	3.00@4.00	90@95	70@75	70@75	53@55
carbonate	*7.50@8.50	*7.50@8.50	*7.50@8.50	*7.50@8.50	—@—	—@—	—@—	—@—	—@—	—@—
Cuttlefish, Trieste	26@28	26@28	30@32	32@35	32@35	32@35	35@40	21@22	22@26	14½@15
French	26@28	26@28	30@—	18½@19	18½@19	18½@19	18½@19	18@19	20@22	12½@13
jewelers', large	65@70	65@70	65@70	70@75	70@75	70@75	70@75	70@75	74½@75	70@75
jewelers', small	52@—	52@—	52@—	50@—	50@—	50@—	50@—	50@55	50@55	50@52
Dragon's blood, mass	22@60	22@60	25@60	25@65	25@65	25@65	25@65	25@65	25@65	25@27
reeds	80@85	80@85	80@85	80@85	85@90	90@95	70@75	70@72	72@75	45@47
Epsom salt, bgs	1.75@1.85	1¾@2	2@3½	3¾@4	3¾@4¼	4½@6	3¾@4	1¼@1¾	1¾@2	1@1 1/10
barrels	1.75@1.85	1¾@2	2@3½	3¾@4	3¾@4¼	4½@6	3¾@4	1¼@1¾	1¾@2	1@1 1/10
Ergot, Russian	68@70	70@72	72½@75	75@80	75@80	75@80	90@95	87½@90	90@92½	65@70
Spanish	68@70	75@80	75@80	85@90	85@90	85@90	95@1.00	87½@90	90@95	75@80
Ether, U. S. P., 1900	15@20	15@20	15@20	15@20	15@20	15@20	15@20	15@20	15@20	18@24
washed	18@27	18@27	18@27	18@27	18@27	18@27	18@27	18@27	18@27	18@27
U. S. P., 1880	22@28	22@28	22@28	22@28	22@28	22@28	22@28	22@28	22@28	22@28
nitrous, concentrated	48@—	48@—	48@—	48@—	48@—	48@—	48@—	48@—	—@—	—@—
acetic, 95 per cent	19@—	19@—	19@—	19@—	19@—	19@—	—@—	—@—	—@—	—@—
U. S. P., 8th, 7th	50@62	50@62	50@62	50@62	50@62	50@62	—@—	—@—	—@—	—@—
Eucalyptol	1.00@1.10	90@1.05	90@1.05	65@75	65@70	65@70	65@70	65@70	65@70	75@80
Formaldehyde, 40 per cent	12@12¼	10@11	13¼@14	11@12¼	9½@10	9½@10	8½@9½	8¼@9½	8½@9½	8½@9¼
Fusel oil, crude, gal	*3.50@3.75	4.10@4.25	4.50@6.00	3.75@4.00	3.45@3.70	2.65@2.75	2.25@2.30	2.25@2.30	2.20@2.30	1.10@1.15
refined	3.85@4.00	5.25@5.50	6.25@—	4.75@5.00	5.25@5.50	3.25@3.50	3.25@3.35	2.85@3.00	2.60@2.75	1.60@1.65
Gelatine, silver, lb	1.15@1.25	1.00@—	1.00@90	90@95	60@65	50@—	45@50	35@40	35@40	26@30
gold	*90@1.00	*90@1.00	*90@1.00	75@80	75@80	50@60	40@42	40@42	40@42	35@37
Glycerine, C. P., in bulk, lb	55@65	42½@44	50@51	57@58	52½@55	*34½@40	22@22½	20@—	22@22½	19¾@—
C. P., in cans	56@57	43¾@45	51@52	58@59	53½@56	*34½@40	23@23½	21@—	23@23¾	20¾@—
dynamite, drums included	53@55	45@47	47@50	55@56	45@55	*35@38	21@21½	18½@19	21@22½	19@19¼
30 deg., yellow, distilled	53@53	45@47	47½@50½	56@57	43@45	*35@38	21@21½	18½@19	21@22½	19@19¼
candle crude	—@—	34½@35½	38¾@40	45@46	42@43	nominal	*17½@18	13¾@14	16@16½	14¾@15
soap lye, loose	38@38¼	31½@32½	38¾@40	39@40	39@43	*28@—	15@16	12¾@12½	14½@14¾	13@13¼
saponification, loose	42@42½	34½@35½	38¾@40	45@46	43@45	nominal	*17½@18	13¾@14	16@16¼	14¾@15
Grains of paradise	1.65@1.75	Nominal	nominal	1.00@—	70@75	30@35	30@35	20@25	20@25	15@16
Guaiacol, liquid	15.00@16.00	15.00@16.00	13.75@—	13.75@—	13.75@—	2.50@—	2.30@—	2.30@—	2.30@—	1.70@1.80
Guarana	1.25@1.30	1.15@1.20	1.15@1.20	1.20@1.25	1.25@1.35	1.00@1.15	1.10@1.15	1.00@1.10	1.10@1.15	1.80@1.90
Haarlem oil, green, bottle	3.00@3.25	2.60@2.75	2.60@2.65	2.35@2.75	2.00@2.10	2.05@2.10	2.25@2.30	2.10@2.15	2.30@2.35	1.65@1.70
Hydrogen peroxide, gross	6.50@18.00	6.50@18.00	6.50@18.00	7.25@21.00	8.00@12.00	6.75@20.00	5.50@13.50	5.50@13.50	6.00@16.00	4.00@9.00
Hydroquinone	2.00@2.25	3.50@4.00	6.00@6.20	6.00@6.08	6.00@6.08	5.00@—	4.00@4.50	1.50@1.75	—@—	—@—
Hypophosphite of lime	77@79	77@79	77@79	77@79	77@79	77@79	77@79	77@79	77@79	52@54
potash	1.50@—	1.50@—	1.50@—	1.50@—	92@94	92@94	92@94	92@94	92@94	57@59
soda	82@84	82@84	82@84	82@84	82@84	82@84	82@84	82@84	82@84	57@59
Iceland moss	10@12	10@12	10@12	11@12	7@8	7@8	9@10	9@10	12@14	5¼@6
Iodine, resublimed	4.25@4.30	4.25@4.30	4.25@4.30	4.25@4.30	4.25@4.30	4.25@4.30	3.75@3.80	3.75@3.80	3.75@3.80	3.55@3.60
Iodoform	5.00@5.05	5.00@5.05	5.00@5.05	5.00@5.05	4.60@4.65	4.00@4.05	4.20@4.25	4.20@4.25	4.20@4.25	4.00@4.05
Irish moss, ordinary	8@10	8@10	8@10	8@12	7@12	7@12	12@15	12@15	12@15	6@7
bleached	11@14	11@14	11@14	13@15	12@13	12@13	15@20	15@20	15@20	8@15
Isinglass, Russian	4.75@5.00	5.25@5.50	5.50@6.00	7.50@8.00	7.50@8.00	7.50@8.00	5.50@5.75	5.25@5.50	4.75@5.00	3.50@3.75
American	75@80	75@80	75@80	75@80	75@80	75@80	78@80	80@1.00	80@1.00	71@76
Kamala, U. S. P	1.75@—	1.75@—	1.75@—	1.75@—	1.50@—	1.50@—	1.50@—	1.75@2.00	1.75@2.00	—@—
Kola nuts, West Indian	12@12½	11@12	19@20	25@—	13@15	9½@10	8@9	8@9	8½@10	8@9
Lanoline, hydrous	35@40	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@1.05	1.00@—	—@—	—@—	—@—
anhydrous	52@55	1.40@1.45	1.40@1.45	1.40@1.45	1.40@1.45	1.40@1.45	1.40@—	—@—	—@—	—@—
Licorice, powder, compound, Syrian, U. S. P	21@—	21@—	15@24	14@24	†12@14	†10@11	†10@11	†8@10	†6@8	†16¼@20
stick, Italian	30@48	29@48	29@48	35@45	25@32	25@27	25@27	23@25	22@25	24@25
Lithia carbonate	1.02@1.05	1.02@1.05	97@98	90@1.00	90@1.00	90@1.00	1.00@1.10	1.00@1.10	1.00@1.10	65@70
Lupulin	1.00@1.35	1.35@—	1.75@2.00	1.25@1.50	1.25@1.50	1.50@1.75	1.25@1.50	1.25@1.50	2.00@2.25	1.75@2.00
U. S. P	3.00@3.50	2.25@3.00	2.25@3.00	2.25@—	2.25@—	2.25@—	2.25@—	—@—	—@—	—@—
Lycopodium, U. S. P	1.20@1.30	1.65@1.70	3.60@3.75	2.75@—	1.75@2.00	1.00@1.10	90@95	1.00@1.10	70@80	41@42
Magnesia, carbonate	20@23	*1.25@1.35	19@22	16@17	14@15	4¼@5½	4¼@5½	4¼@5¼	4¼@5¼	5¼@6
Manna, large, flakes	*1.05@—	*1.25@1.35	1.25@1.35	*1.25@—	*1.25@—	75@80	80@85	70@75	70@75	85@90
small, flakes	90@95	95@1.00	80@85	85@90	85@90	52@55	45@47	37½@40	42@45	39@42
Menthol	3.20@3.40	3.25@3.40	2.85@3.00	3.25@3.50	3.25@3.30	2.60@2.75	2.60@2.70	2.90@3.00	2.50@2.60	2.95@3.05
Mercury, bisulphate	1.07@—	1.00@—	1.00@—	2.70@—	1.39@1.40	1.20@1.22	1.13@1.14	81@83	72@74	42@46
Mercury and chalk	62@—	60@—	60@—	1.57@—	83@84	74@—	—@—	—@—	—@—	—@—
Mercurial ointment, 33½ per cent	53@—	61@—	61@—	1.58@—	89@90	80@81	77@78	52@—	52@—	35@36
50 per cent	86@—	83@—	83@—	1.78@—	99@1.00	90@91	87@88	62@—	62@—	45@46
Milk, powdered	13@16	12@14	12@14	12@14	12@14	12@14	12@14	12@14	12@14	11@13
Musk, pods, Cab	10.00@10.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50	8.00@8.50
Tonquin	15.50@16.00	13.00@15.00	13.00@15.00	13.00@15.00	13.00@15.00	13.00@15.00	13.00@15.00	13.00@15.00	13.00@15.00	13.00@15.00
grain, Cab	16.60@17.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00	12.00@15.00
Tonquin	25.00@26.00	16.00@19.00	16.00@19.00	16.00@19.00	16.00@19.00	16.00@19.00	16.00@19.00	16.00@19.00	16.00@19.00	16.00@19.00
druggists'	23.00@24.00	16.00@16.50	16.00@16.50	16.00@16.50	16.00@16.50	16.00@16.50	16.00@16.50	16.00@16.50	16.00@16.50	16.00@16.50
synthetic	11.50@13.00	11.50@12.50	11.50@12.00	8.50@9.00	8.50@9.00	8.50@9.00	8.50@9.00	8.50@9.00	4.50@5.50	4.00@5.00	1.75@3.00
Mirbane oil, drums	18@20	20@22	31@33	33@35	31@35	31@33	45@50	30@35	15@17	6½@7
Naphtha, soluble	30@32	35@38	35@38	35@38	35@38	35@38	—@—	—@—	—@—	—@—
Naphthaline, bls	9½@10¼	8@9½	10½@11	14½@15	13@14	13@15	13@14	4¾@5	3¾@4	.0235@.025
flakes	9½@10¼	8@9½	10½@11	15@16	13@14	13@15	14@15	4¾@5	3¾@4	.0235@.025
Nitrate of silver, oz	46¾@48¾	43¾@45¾	41¾@43¾	38¾@40¾	34¾@36¾	31½@33½	31@33	32½@34½	31½@33¼	33¾@35¾
Nux vomica	6½@7½	7@7½	7@7½	7@7½	6@7	6@6¼	5½@6	5@5½	6@6½	4@5
powdered	11@11½	10½@11	11@12	11@13	9@10	8½@10	8½@10	9@9½	8½@9	7½@8

MUTUAL CHEMICAL CO. OF AMERICA

BICHROMATE OF POTASH

BICHROMATE OF SODA

55 John Street, New York, N.Y.
Factories: Jersey City, N.J., Baltimore, Md.

	1917.	1916				1915				1914.
	Jan. 1.	Oct.	July.	April.	Jan.	Oct.	July.	April.	Jan.	Aug.
Olive oil, edible, Italian	1.75@2.25	1.50@1.60	1.35@1.50	1.90@2.10	1.90@2.10	1.90@2.00	1.75@2.00	1.75@2.00	1.10@1.15	—@—
Papain	3.50@4.00	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.25@3.50	3.25@—	—@—
Petrolatum, bbls., light amber	3¾@4¼	3½@4	3½@4	3½@4	3½@4	3@3½	3@3½	3@3½	3@3½	3@3½
cream	6@6½	5¼@5½	5¼@5½	5¼@5½	5¼@5½	5@5¼	4¾@6	3¾@6	4¾@6	4¾@6
lily white	8@8½	7½@7¾	7½@7¾	7½@7¾	7½@7¾	7@9	7@9	7@9	7@9	7@9
snow white	11¼@12½	11¼@11¾	11¼@11¾	11¼@11¾	11½@11¾	11@11½	10@11	10@11	10@11	10@11
Phosphorus, yellow	80@—	80@—	80@—	35@—	35@—	35@—	35@—	35@—	35@—	45@—
red	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—	1.00@—
Pilocarpine, oz	*18.00@20.00	*18.00@20.00	*18.00@20.00	4.00@6.00	4.00@5.00	4.00@5.00	4.00@5.00	4.00@5.00	4.00@5.00	4.00@6.00
Podophyllin, U. S. P., lb	2.70@2.80	2.70@2.80	2.70@2.80	2.70@2.80	2.30@2.50	2.30@2.50	2.95@3.00	2.95@3.00	2.95@3.00	—@—
Poppy heads	75@—	75@—	75@—	75@—	35@40	35@40	35@40	35@40	35@40	25@35
Precipitate, red	1.57@1.67	1.49@1.59	1.49@1.59	3.38@3.48	1.74@1.84	1.56@1.66	1.48@1.58	1.00@1.19	1.00@1.10	75@80
white	1.67@1.72	1.59@1.64	1.59@1.64	3.48@3.53	1.84@1.89	1.66@1.71	1.58@1.63	1.14@1.19	1.05@1.10	75@80
Potash, permanganate	2.75@3.00	1.75@2.00	1.60@1.70	1.90@2.05	1.75@—	1.25@—	75@86	55@60	14@16	9¾@10
bicarbonate	1.40@1.50	1.00@1.20	1.65@—	1.40@—	45@50	37@40	30@32	26@28	25@26	—@—
cyanide, U. S. P.	*2.25@2.30	3.75@3.80	—@—	—@—	—@—	—@—	—@—	—@—	—@—	19@22
iodide, bulk	3.54@3.50	—@—	3.90@3.95	4.30@4.35	3.70@3.75	3.70@3.75	3.15@3.20	3.15@3.20	3.15@3.20	2.95@3.00
citrate, bulk	1.50@—	1.50@—	1.70@1.72	1.70@1.72	73@75	73@75	69@70	69@70	69@70	—@—
acetate	1.25@1.26	1.25@1.26	1.45@1.46	1.45@1.46	50@51	40@41	33@34	21@22	—@—	—@—
Quassia, chips	6@7	12@14	12@14	8@9	7@8	5@—	5@—	5@—	5@—	—@—
Quicksilver, flask lots	80.00@82.00	75.00@76.00	80.00@85.00	180.00@195.00	140.00@150.00	89.00@90.00	—@—	—@—	—@—	—@—
jobbing lots	1.06@1.15	1.05@1.15	1.10@1.15	2.55@2.60	1.85@1.90	1.25@1.30	1.30@1.35	1.20@1.25	80@85	52@64
Resorcin, crystals	22.00@25.00	28.00@29.00	20.00@—	20.00@—	6.00@8.00	6.00@8.00	2.00@—	1.25@1.30	1.10@1.15	80@85
Rhodol	*6.50@6.75	*6.50@6.75	*6.50@6.75	*8.50@6.75	*6.50@6.75	6.50@6.75	4.50@4.80	4.50@4.80	—@—	—@—
Rosewater, triple, demijohn	33½@34	34@34½	—@—	60@—	60@—	60@—	60@—	60@—	60@—	—@—
Rochelle salt	60@—	60@—	35½@—	33½@—	29½@30	—@27	25@—	21@—	20@—	17½@18
Russian white paraffine oil, medicinal	2.50@3.00	2.50@3.00	2.50@3.00	2.50@3.00	nominal	nominal	nominal	nominal	nominal	30@45
Saccharine	20.50@21.50	20.00@21.50	16.00@—	11.50@12.00	11.50@12.00	8.50@9.00	4.00@4.25	2.25@2.75	2.85@3.00	1.15@1.25
Salicine, bulk	16.00@17.00	9.25@10.20	9.50@10.00	5.50@6.25	5.50@6.25	5.50@—	4.20@4.30	4.25@4.50	4.25@4.50	3.75@3.85
Salol, manufacturers' prices	2.50@—	3.50@—	3.75@—	2.75@3.05	2.75@3.05	*2.25@2.35	*1.75@1.85	1.10@1.15	1.00@1.06	55@67½
second hands	2.35@2.50	3.30@3.50	7.00@8.00	9.50@10.00	9.25@10.00	—@—	—@—	—@—	—@—	—@—
Santonin, crystals, bulk, lb	36.00@37.50	35.00@40.00	35.00@40.00	38.00@40.00	38.00@40.00	40.00@45.00	60.00@70.00	40.00@42.00	40.00@42.00	29.70@30.00
powdered	37.00@38.00	36.00@42.00	36.00@42.00	39.00@41.00	39.00@41.00	41.00@46.00	61.00@71.00	42.00@44.00	42.00@44.00	30.20@30.50
seidlitz	26@—	26@—	27½@—	25%@—	23@23½	21@—	20@—	17½@—	16½@17½	14@14½
Soda, benzoate, granular, lb	8.75@9.00	8.00@9.00	5.85@6.00	5.00@5.50	3.75@4.00	3.25@3.50	2.50@2.65	1.80@1.95	50@55	23¾@24
cyanide	*1.90@2.00	45@55	40@—	40@—	25@29	—@—	—@—	—@—	—@—	—@—
iodide	3.50@3.55	3.50@3.55	3.50@3.55	3.50@3.55	3.50@3.55	3.50@3.55	3.50@3.55	3.50@3.55	3.50@3.55	—@—
nitrite, technical	18@21	18@21	18@21	18@21	18@21	18@21	18@21	7¼@7½	25@28	5½@6¾
U. S. P.	23@24	23@24	23@24	23@24	23@24	23@24	23@24	19@17	—@—	—@—
salicylate	1.25@1.35	1.70@1.75	3.00@3.25	4.00@4.25	4.00@—	3.35@3.50	3.25@—	1.50@1.60	65@70	27@28
sulphocarbolate	95@98	95@98	—@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Soluble cotton	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00	80@1.00
St. John's bread	*6@7	3¾@4	3¾@4	3¾@4	3¾@4	3¾@4	6@7	6@7	12@12½	2¾@3
Strontium, nitrate	40@45	32@35	48@50	22@23	22@23	22@23	17½@18	17½@18	15@17	7¼@8
Strychnine, alkaloid	1.35@1.45	1.08@—	1.08@—	—@—	—@—	—@—	—@—	—@—	—@—	—@—
sulphate	1.10@1.20	90@96	90@96	90@96	70@78	70@76	60@66	50@56	40@46	46@56
Sugar of milk, powdered	32@35	23@24	20@22	15@16	14@15	14@—	14@16	14@16	15@16	12@13
Sulfonal, 100-oz. lots, oz	1.25@1.50	50@1.15	50@1.15	50@1.15	50@1.15	50@1.15	50@1.15	50@1.15	50@1.15	50@1.15
Sulphur, roll	1.95@2.25	1.95@2.25	1.95@2.25	1.95@2.25	1.85@2.15	1.85@2.15	1.85@2.15	1.85@2.15	1.85@2.15	1.85@2.15
flour	2.10@2.50	2.10@2.50	2.10@2.50	2.10@2.50	2.00@2.40	2.00@2.40	2.00@2.40	2.00@2.40	2.00@2.40	2.00@2.40
flowers	2.30@2.70	2.30@2.70	2.30@2.70	2.30@2.70	2.20@2.60	2.20@2.60	2.20@2.60	2.20@2.60	2.20@2.60	2.20@2.60
Tamarinds, lb	5@5¼	3¾@4	3¾@4	3½@3¾	3½@3¾	3½@3¾	3½@3¾	3¾@4	3¾@4	4¼@5
in kegs, per keg	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50	2.50@2.75	2.50@2.75	2.50@2.75
Tartar emetic, casks, lb	55@55½	55@55½	55@55½	55@55½	47@47½	45@45½	44½@45	36@36½	35@40	22½@23
U. S. P.	61@63	61@63	61@63	61@63	53@54	51@52	50@—	—@—	—@—	—@—
Terpineol, C. P.	75@85	75@85	1.10@1.25	1.10@1.25	50@1.00	50@1.00	45@50	45@50	35@45	—@—
Terpinhydrate	55@60	50@55	50@56	—@—	—@—	—@—	—@—	—@—	—@—	—@—
Thymol	10.50@11.50	9.50@10.00	10.00@10.25	11.00@12.00	12.00@14.00	12.00@14.00	8.75@9.25	7.00@8.00	6.50@7.00	2.75@3.00
iodide, oz	10.75@11.75	3.00@3.25	61@62	61@62	61@62	61@62	40@45	40@45	1.00@1.55	—@—
Toluol, pure, gal	2.05@2.15	2.25@2.50	4.50@5.00	4.00@4.50	4.75@5.00	4.00@4.50	2.50@3.00	nominal	—@—	—@—
90 per cent., gal	2.05@2.15	2.25@3.00	4.00@4.50	4.00@4.50	4.75@5.00	4.00@4.50	2.50@3.00	nominal	—@—	—@—
Trional	1.30@1.50	60@1.30	60@1.30	60@1.30	60@1.30	80@1.30	50@1.30	50@1.80	50@1.30	—@—
Vanilline, oz	50@60	55@60	57@60	57@60	57@60	50@52	40@42	34@36	34@36	33@34
Venice turpentine, artificial	11@12	11@12	11@12	12@12½	12@12½	11@12	10@11	10@11	10@11	8¼@9
true	3.25@—	3.00@—	2.00@—	1.00@1.25	70@75	52½@55	35@50	32@35	28@30	23¼@25

* Nominal. † Spanish licorice in powdered form was quoted until early this year, when it was replaced with Syrian goods.

WORLD'S PRODUCTION OF CRUDE PETROLEUM SINCE 1857 (in 42-Gal. Bbls.).

Year.	Roumania.	United States.a	Italy.	Canada.	Russia.	Galicia.	Japan and Formosa.	Germany.	India.	Dutch East Indies.	Peru.	Mexico.	Argentina.	Trinidad.	Egypt.	Other countries.	Total.	Year.
1857	1,977																1,977	1857
1858	3,560																3,560	1858
1859	4,349	2,000															6,349	1859
1860	8,542	500,000	36														508,578	1860
1861	17,279	2,113,600	29														2,130,917	1861
1862	22,198	3,056,890	29	11,775													3,091,692	1862
1863	27,943	2,611,300	58	82,814		40,816											2,762,940	1863
1864	33,013	2,116,109	72	90,000		94,586											2,303,780	1864
1865	39,017	2,497,700	2,265	110,000		66,542											2,715,524	1865
1866	42,534	3,597,700	992	175,000		83,052											3,899,278	1866
1867	50,838	3,347,300	791	190,000		119,917											3,708,846	1867
1868	55,369	3,646,117	367	200,000		88,327											3,990,180	1868
1869	58,533	4,215,000	144	220,000		202,308											4,695,985	1869
1870	83,765	5,260,745	88	250,000		204,618											5,799,214	1870
1871	90,000	5,205,234	273	289,397		165,129											5,730,063	1871
1872	91,251	6,293,194	331	308,100		194,391											6,877,267	1872
1873	104,036	9,895,786	467	355,052		474,379											10,837,720	1873
1874	103,177	10,926,945	604	168,807		583,751	149,837										11,933,121	1874
1875	106,569	8,787,514	813	220,000		697,364	158,522	4,566									9,977,348	1875
1876	111,314	9,132,669	2,891	312,000		1,320,528	164,157	7,708									11,051,267	1876
1877	108,569	13,350,363	2,934	312,000		1,800,720	169,792	9,560									15,753,938	1877
1878	109,300	15,396,868	4,329	312,000		2,400,960	175,420	17,884									18,416,761	1878
1879	110,007	19,914,146	2,891	575,000		2,761,104	214,800	23,457									23,601,405	1879
1880	114,321	26,286,123	2,035	350,000		3,001,200	229,120	25,497	9,310								30,017,606	1880
1881	121,511	27,661,238	1,237	275,000		3,601,441	286,400	16,751	29,219								31,992,797	1881
1882	136,610	30,349,897	1,316	275,000		4,537,815	330,076	15,549	58,025								35,704,288	1882
1883	139,486	23,449,633	1,618	250,000		6,002,401	365,160	20,473	26,708								30,255,479	1883
1884	210,667	24,218,438	2,855	250,000		10,804,577	408,120	27,923	46,161								35,968,741	1884
1885	193,411	21,858,785	1,941	250,000		13,924,596	465,400	29,237	41,360								36,764,730	1885
1886	168,606	28,064,841	1,575	584,061		18,006,407	305,884	37,916	73,864								47,243,154	1886
1887	181,907	28,283,483	1,496	525,655		18,367,781	343,832	28,645	74,284								47,807,083	1887
1888	218,576	27,612,025	1,251	695,203		23,048,787	406,537	37,436	84,782								52,164,597	1888
1889	297,668	35,163,513	1,273	704,690		24,609,407	515,268	52,811	68,217	94,250							61,507,095	1889
1890	383,227	45,823,572	2,998	795,030		28,691,218	659,012	51,420	108,296	118,065							76,632,838	1890
1891	488,201	54,292,655	8,305	755,298		34,573,181	630,730	52,917	106,029	190,131							91,100,347	1891
1892	503,175	50,514,657	18,321	779,753		35,774,504	646,220	68,901	101,404	242,284							88,739,219	1892
1893	535,655	48,431,006	19,069	798,406		40,456,519	692,669	106,384	99,390	298,969	600,000						92,038,127	1893
1894	507,255	49,344,516	20,552	829,104		36,375,428	949,146	171,744	122,564	327,218	688,170						89,335,697	1894
1895	575,200	52,892,276	25,843	726,138		46,140,174	1,452,999	141,310	121,277	371,536	1,215,757						103,662,510	1895
1896	543,348	60,960,961	18,149	726,822		47,220,633	2,443,080	197,082	145,061	429,979	1,427,132	47,536					114,159,183	1896
1897	570,886	60,475,516	13,892	709,857		54,399,568	2,226,368	218,559	165,745	545,704	2,551,649	70,831					121,948,575	1897
1898	776,238	55,364,253	14,489	758,391		61,609,357	2,376,108	265,389	183,427	542,110	2,964,035	70,905					124,924,682	1898
1899	1,425,777	57,070,850	16,121	808,570		65,954,968	2,313,047	536,079	192,232	940,971	1,795,961	80,166					131,143,742	1899
1900	1,628,535	63,620,529	12,102	913,498		75,779,417	2,346,503	866,814	358,297	1,078,264	2,253,355	274,800					149,132,116	1900
1901	1,678,320	69,389,194	16,150	756,679		85,168,556	3,251,544	1,110,790	313,630	1,430,716	4,013,710	274,800				b 20,000	167,424,089	1901
1902	2,059,935	88,766,916	18,933	530,624		80,540,044	4,142,159	1,193,038	353,674	1,617,363	2,430,465	286,725				b 26,000	181,965,876	1902
1903	2,763,117	100,461,337	17,876	486,637		75,591,256	5,234,475	1,209,371	445,818	2,510,259	5,770,056	278,092				b 36,000	194,804,294	1903
1904	3,599,026	117,080,960	25,476	552,575		78,536,655	5,947,383	1,419,473	637,431	3,385,468	6,508,485	345,834	220,653			b 40,000	218,299,419	1904
1905	4,420,987	134,717,580	44,027	634,095		54,960,270	5,765,317	1,472,804	560,963	4,137,098	7,849,896	447,580	320,379			b 30,000	215,361,296	1905
1906	9,378,184	126,493,936	53,577	569,753		58,897,311	5,467,967	1,710,768	578,610	4,015,803	8,180,657	536,294	1,097,264			b 30,000	214,010,124	1906
1907	8,118,207	166,095,335	59,875	788,872		61,850,734	8,455,841	2,091,838	756,631	4,344,162	9,982,597	756,226	1,717,690	101		b 30,000	264,958,109	1907
1908	8,252,157	178,527,355	50,966	527,987		62,186,447	12,612,295	2,070,145	1,009,278	5,047,038	10,283,357	1,011,180	3,481,610	11,472	169	b30,000	285,101,456	1908
1909	9,327,278	183,170,874	42,388	420,755		65,970,350	14,932,799	1,889,563	1,018,837	6,676,517	11,041,852	1,316,118	2,488,742	18,431	57,143	b 20,000	298,391,647	1909
1910	9,723,906	209,557,248	50,830	315,895		70,336,574	12,673,688	1,930,661	1,032,522	6,137,990	11,030,620	1,330,105	3,332,807	20,753	142,857	b 20,000	327,636,356	1910
1911	11,107,450	220,449,391	74,709	291,096		66,183,691	10,519,270	1,658,903	1,017,045	6,451,203	12,172,949	1,368,274	14,051,643	13,119	285,307	9,150	b 20,000	345,673,200	1911
1912	12,976,232	222,935,044	53,778	243,336		68,019,208	8,535,174	1,671,405	1,031,050	7,116,672	10,845,624	1,751,143	16,558,215	47,007	438,305	205,906	b 20,000	352,446,598	1912
1913	13,554,768	248,446,230	47,198	228,080		62,834,356	7,818,130	1,942,009	b 995,764	7,930,149	11,172,294	2,133,261	25,902,439	130,618	503,616	94,635	b 20,000	383,753,547	1913
1914	12,826,579	265,762,535	39,849	214,805		67,020,522	b 5,033,350	2,738,378	b 995,764	7,409,792	c 11,834,492	1,917,802	21,188,427	275,500	643,533	777,038	b 20,000	398,668,366	1914
1915	12,029,913	281,104,104	b 39,548	215,464		68,548,062	4,158,899	3,118,464	b 995,764	8,202,674	c 12,386,808	2,487,251	32,910,508	516,120	b 750,000	221,768	b 10,000	427,695,347	1915
	130,012,387	3,616,561,244	842,020	23,709,074	1,690,781,907	136,032,500	30,169,622	13,961,333	81,592,385	148,999,921	16,794,223	123,270,377	1,033,121	2,819,430	1,308,496	372,000	6,018,260,040	

a Marketed production. b Estimated. c Includes British Borneo.

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FLAXSEED MARKETS IN 1916.

Wide Range in Flaxseed Prices at Minneapolis.

Another year of high prices for flaxseed just closed, but the high prices of the year before failed to stimulate the producers into sufficient activity to take over the responsibility of raising enough seed to take care of the requirements of the United States. There was but a slight increase in the acreage and only a kind providence made the increased yield of 1916 possible. At the beginning of the year the competition of Argentine flaxseed made the demand for domestic offerings sluggish and featureless. Eastern crushers were able to engage considerable of the Argentine crop at prices that were very moderate, compared with those prevailing in domestic markets, and this gave them the advantage over Western crushers, who found their oil-trading territory considerably restricted. As this happened just prior to the seeding season, there was some reason for the lack of enthusiasm on the part of the farmers. Most of the new ground broken this past year represented the flax acreage increase. High prices prevailing for wheat and the preference the farmer seems to have for that grain prevented any large return of old ground to flax production.

Argentine News Send Up Prices.

At first there was little attention paid to the Argentine offerings by the speculative trade because of the growing dearth of ocean tonnage and the sharp need of foodstuffs and ammunitions abroad, but the sellers of the seed managed to ship what they sold, and with some stock from the previous crop on hand the crushing trade in the East was able to take care of the bulk of the oil trade. However, the flax traders and farmers of the Northwest were mainly bullish and prices began to ascend in the face of the Argentine news. There was a little sobering of speculation, though, when it looked as though Argentine supplies would be shipped over the lakes to apply on Duluth May contracts. Of course, the rules read that "Northwestern" seed shall apply on these contracts, but inasmuch as the Argentine seed was better in quality than much of the Northwestern seed that was applicable it was entirely possible that a change could be made and Argentine seed made applicable.

A good deal of the professional speculative bullishness was due to the very light stocks of seed on hand here all through the year. At the opening of the year the crushers had a very light supply of seed on hand in public and private bins and were indifferent as to the ending of the old crop year. They had considerable oil on hand, apparently more than the trade would need before the new crop came to maturity, and with domestic flaxseed prices going up, compared with Argentine prices, there was no disposition to overload on raw material. Farmers were holding their reserves for better values, and for a time the movement to market was very light. Early in the year they were predicting $3 seed and many of them held for that figure. The market did not respond to bullish influences very freely and it was not until very late in the year that the hopes of the producers came true. Had it come true early in the year no doubt the acreage of the Northwest would have been greatly increased. In view of the fact that the farmers were so bullish on flax futures it seems rather peculiar that they did not increase the acreage devoted to that cereal, in spite of the fact that early year prices did not reach the levels they expected.

Early Crop News Satisfactory.

The growing season was not without excitement. Seeding of wheat was considerably delayed by the late snows and rains, and the lateness of spring work in general threatened to result in a short acreage, but conditions improved in plenty of time to get a good seed acreage in. Inability to get in as much of the wheat acreage as expected resulted in a larger flax acreage than originally intended, and to this fact can be laid the larger crop of seed raised during the year 1916. Early crop news was very satisfactory. It was a little cool for germination until well along in June, although some wheat was seeded in South Dakota as early as March 29. In fact, the adverse weather conditions kept some flax seeding back until after July 1, but the seed put into the ground at that late date brought good returns to the farmers. At the start of the season the trade made rather liberal estimates of the increase in the flax acreage, but the final idea was that only 10 per cent. had been added over the acreage of 1915. A very favorable development, however, was the fact that the large part of the increase was in Montana and Missouri slope country—the best flax producing territory of the country. The southerly flax belt acreage was somewhat reduced, though it was larger than expected at the start, as the persistent rains prevented complete sowing of wheat and corn and the farmers put flax in as a last resort. The early sown seed was in excellent condition late in June and seed sown then started off well, with plenty of warmth and moisture. Up to the middle of July the situation progressed quite favorably, though a few sections complained of the lack of moisture. The early season of liberal moisture and cool weather gave the plants a good root and when nthe drought of late July came along the plant withstood the heat and dryness remarkably well. In fact, the prospects were so good mid-July that the farmers began to market their old crop reserves freely, expecting the new crop to have a depressing influence on prices. A little later the futures began to climb rapidly on drought news and in sympathy with the advance in wheat futures. Around $3 there was considerable profit-taking and a reaction, but the market soon was on the way to the $3 mark on commercial conditions. Oil buyers all over the country had been keeping their stocks light, and when they found there was no hope of a radical decline in values their purchases started an upward move that finally ended with a wild cheer when the futures finally touched the long predicted $3 level in the middle of November.

Early Government Estimates.

The early government estimates were not very encouraging to the flax crushers, who faced a season of light supplies, but the drought and frost damage to the growing crop did not prove as severe as expected and in the end the farmers raised a good crop. The droughty section did not have as great a flax acreage as the sections more favored by weather conditions. Some of the private estimates of the yields were very bullish and it was not until the crop had been harvested did some in the trade believe that the total yield was as heavy as it was. The last government estimate of 15,450,000 bushels of flax was believed too high until late in the season, when reports from North Dakota and Montana changed the minds of many. While the choice seed of 1916 failed to come up to the quality of the choicest of the previous crop, at the same time the average quality was fully as good or better.

When the crop began to move there was a scramble to get a supply of it, with Eastern and Western crushers competing strongly. Eastern crushers bought a large supply that accumulated at Duluth and shipments down the lake just at the close of navigation were very liberal. Minneapolis crushers were handicapped by the lack of elevator space to carry supplies. Lack of an Eastern outlet for different grains resulted in the storage space here being used up early and there was a lack of public elevator space to lease after private bins were filled up. The cost of carrying seed selling at $2.75@3 per bushel was heavy and this discouraged some of the crushers, but the big demand for oil cake and meal at liberal prices servd to offset, and the trade here bought seed freely to convert into oil as fast as possible. With the by-product sold at a round price, the burden of carrying oil was reduced somewhat. The movement was slow getting started and the crest of it came later in the fall than usual, but when shipments started they were very heavy and the bulk of the crop movement was over quickly. At the end of the year there was a very moderate supply of seed in the farmers' hands aside from their seeding requirements. During the summer the supply of seed and oil in Minneapolis was as low as they ever declined since the trade assumed importance locally. Elevator supplies at the beginning of the new year were very moderate, too.

During the summer the crop news of the Northwest had little effect on the oil buyers, as they had good news of the Argentine crop, so the market did not advance as sharply as would have been the case otherwise, but when sensational reports began to come out of the South American country the oil trade evidently gave up the last hope left and began to give their attention to the product of domestic supplies. The market ended the year strong and the turn of the new year saw a very sharp demand for the cash offerings, No. 1 seed selling at full May price at a season when it generally sells at several cents under that future.

Canada Was Disappointing.

The position of Canada as a provider of flax this year was disappointing. The yields over the boundary were light and the local crop was too small to allow of much being shipped to this county. Occasional lots of the old crop came here, but few cars from the new crop were offered. Cars for shipment were practically unavailable, and even though the spread between the markets was favorable at times there was no trade of importance.

Linseed Oil.

The opening of the year in the oil trade was not very propitious. Prices were considered very high by most of the buyers and they refused to make important bookings for either prompt or deferred shipment, though they ended the year 1915 with very light reserves on hand. Argentine news gave them encouragement in their hold-off position and really did help them to get more favorable prices for a time, but in the main the buyers dallied the year away hoping for reactions that seldom developed. When a break came most of them regarded it as the beginning of a real slide, but in every case they were disappointed. The level of the market was abnormal and naturally the trade could expect a sharper decline than usual, but the theory did not prove out and purchases of oil on the breaks did not increase importantly. As a result the buyers were forced into the market intermittently throughout the year, regardless of the quotations prevailing. A few of the big buyers displayed good judgment and contracted for at least a portion of their needs for the balance of the year.

Crushers were mainly independent and awaited the oil buyers' pleasure. The Eastern crushers had a larger and cheaper supply of flaxseed to work with and extended the territory supplied by them. Western crushers had only a limited supply of seed in sight and could not do business in as large a territory as usual, so they proceeded to do what business they could and do it at a profit. There was not the usual and unreasonable concessions made to get orders, and with trade light the grinders managed to make a fair year of it. As the domestic seed crop began to approach maturity conditions were reversed. Western crushers benefited, because the buyers were holding off for the usual bear movement that starts with the movement of the crop. They continued to defer buying because of the high prices, placing their hopes of relief on another year of cheap Argentine flax, but finally had to give up this hope and take the offerings of Western crushers. When the buying began the Western crushers regained part of the business they lost during the previous season and at present seem to have quite an advantage over the Eastern trade, especially where deferred supplies are concerned.

Crushers had to contend with very unfavorable operating conditions most of the year and their output was restricted somewhat. Early in the year the congestion in Eastern railroad yards interfered with their shipments of oil cake abroad, and with the meal demand moderate they were unable to crush as freely as they wanted. However, they managed to run spasmodically, and when there was no oil demand to speak of they built up their reserves, which were a great help to them a little later in the season, when they could get no flaxseed to crush and had greater difficulty in getting rid of their by-product, which chokes them up in a short space of time if not taken care of. A good many of the late spring and early summer contracts for oil were filled from tanks without fresh grinding, and just prior to the movement of the new crop the tank reserves were practically exhausted, reaching the lowest stage ever known in local trade circles.

When the new crop movement began to assume liberal proportions there was great difficulty in getting seed to mills for crushing, some cars being several weeks reaching them from railroad yards. Before the end of the year there was much difficulty experienced in getting cars to ship out oil promptly and shipping directions could not be filled promptly. Some of the buyers had the habit of deferring shipping directions until the last minute and were the ones who suffered most from the car shortage. Wise buyers filed their directions ahead of time and in most cases received their oil before their reserves were exhausted.

At the end of the year the usual holiday duliness prevailed, but the slack period was shorter than usual and immediately after the turn of the new year orders began to pour in in unusual proportion for that season of the year. During the month of December the crushers booked better than the usual volume of forward business, some sales running through to the following September and October. Shipping directions on maturing contracts were usually prompt, and in many cases better than prompt, indicating that the buyers were badly in need of supplies from time to time. Tank cars were in good supply at the beginning of the new crop year, but a little later were rather hard to get on account of the length of time taken by the railroad companies in returning them to shippers.

Linseed Oil Meal.

In common with other flaxseed commodities the oil meal market started the new year rather sluggishly. Prices were high and the buyers had some contracts hanging over from the previous year. There were enough of these contracts running with the mixed car feed brokers to take care of a large part of the moderate output and crushers did not care much concerning fresh business. During the early part of the year there was no important demand to be met by the crushers, but on account of the light output prices held firm. A severe cold spell late in January resulted in a momentary increase in buying. From then until early in March the demand dragged mostly, though the bulk of the output was moved at fairly firm levels. Warmer weather about the first of March and a slightly increased output resulted in a sharp break in prices. A strong tone in the mill feed market and a break of $5 in meal prices diverted consideroble buying to the oil meal market and around $30 a brisk trade developed, which continued for some time. After the buyers were filled up around $30 another decline started and with the demand lacking fervor and the outlet for oil cake restricted, prices worked their way down $10 from the high prices of the season. Along in May there was a sharp revival in trade, owing to the cottonseed meal developments, and crushers picked up orders from a much wider territory.

The light supply of cottonseed meal and drought in territory along our Southern border diverted a lot of mill feed from winter wheat mills, and as a consequence there ws a large increase in the buying of meal in Iowa, Kansas, Indiana and Missouri. The accumulation on hand was quickly used up and prices started booming again. In fact, the turning point came and up to the end of the year the meal market was in pretty fair shape, with few periods when there was any chance of the lack of outlet forcing the mills to close. Most of the trouble was due to the inability to get cars for shipment. During the late spring and early summer interest in offerings lagged a little, but prices held well on account of the revival in cake trading. Early in June the crushers began to pick up cake orders and from then on were not bothered by the lack of a meal demand. Prices continued to swing upward until they were $20 per ton higher than the low level of the season. The year closed with a spasmodic and featureless demand, but no glut of supplies on hand. Prices were off a little from the top on January 1.

Linseed Oil Cake.

Lack of freight room and restrictions put on buying prevented an unusually big oil cake trade during the past year, but the volume of trade was very liberal at that. At the opening of the year there were numerous contracts to fill and the crushers were shipping steadily to the seaboard. Holland was the really big buyer and the demand from that country was sharp, but the Allies watched the total amount imported there very carefully and from time to time put a check on importations when they exceeded previous figures The fear was that some of the supply was going to the Central Powers. It took some time for the Hollanders to convince the Allies that owing to unusual conditions the needs were much greater, but when the situation was recognized permission was given to take supplies a little more freely. As soon as this permission was granted better sales were made by local crushers. The Holland Government requisitioned boats to carry the supplies forward and prices began to go up.

There was considerable difficulty in getting supplies to the seaboard for loading owing to the congested conditions in Eastern railroad yards, and in a number of cases consignments failed to make connections with steamships, although shipment was made from mills in plenty of time to reach ports. Buying of meal by United Kingdom buyers was limited and practically the entire output was taken by Holland and the Scandinavian countries. These countries are usually supplied from the Rhine mills of Germany and had to pay exorbitant prices to take care of their requirements from this country. Warring countries were big buyers of dairy products, and the increase in cattle needed to take care of the large number of Belgian refugees in Holland alone accounted for a largely increased demand.

During late February and up to June 1 the cake market drifted along with only an occasional inquiry and very little trade. Early in June the trade here began to get inquiries from exporters for some stuff to be shipped immediately to Denmark and Scandinavian countries. This was the beginning of a large expansion in trade that held steady until the lack of boats to carry consignments to Europe began to be felt. During July and August liberal bookings were made by the crushers, and they began to get cautious, remembering the experience of the previous year, when they were hard put to make deliveries on contracts so freely made for November shipment. Sales made late in July were for prompt shipment mostly and the buyers were evidently in urgent need of supplies.

When the new flax crop began to move freely and the crushers were operating heavily there was a dearth of cars to carry supplies to the Eastern seaboard, especially after the close of navigation on the Great Lakes. For a time the outlet to Baltimore was good, but early in the fall the roads carrying supplies to that port began to show signs of increasing distress, and unless the shipper could show that the consignments were to be taken care of promptly on arrival there it was impossible to get billing. The year ended with a large number of contracts on hand to be filled and much difficulty being experienced in getting supplies to the seaboard. Ocean freights were scarce, but the exporters had to worry about that feature of the situation mostly. The Holland Government took care of the supplies going to Holland, though the need of food for humans finally resulted in less room being allowed for the shipment of food for cattle. Later in the year there were some sales made for spring shipment, and there was a fairly good demand experienced considering the conditions prevailing at home and abroad. Prospects of peace did not seem to have any depressing effect on the market. In fact, should peace develop there would be an opportunity to send accumulated supplies forward in free volume, and this would make room for further shipments from Minneapolis.

If ocean freights are available for shipment this year the crushers look for even heavier buying than during the past year and a strong range of values.

No. 1 Flaxseed Prices.

Monthly range of cash prices, daily closing quotations, for No. 1 flaxseed in the Minneapolis market for the calendar year 1916, with comparisons, for the year 1915, follow:—

	1916.	1915.
January	$2.15¾@2.37	$1.58¼@1.94¼
February	2.25 @2.39	1.80¾@1.92½
March	2.15¾@2.35½	1.81¼@2.02½
April	2.00 @2.22¼	1.85 @1.97¼
May	1.83½@2.00¾	1.89 @2.00¼
June	1.73½@1.88½	1.68¼@1.90
July	1.79 @2.12	1.52¼@1.75¼
August	2.04 @2.28	1.57¼@1.72¾
September	2.00¾@2.32	1.61 @1.87¾
October	2.26¼@2.70	1.77 @1.91¼
November	2.59¾@2.93½	1.81 @2.11¾
December	2.76½@2.94	1.99 @2.21

Receipts of Flaxseed.

Receipts of flaxseed in the Minneapolis market during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	319,470	599,010
February	398,800	443,200
March	810,160	384,250
April	485,880	142,200
May	440,250	76,800
June	362,880	146,400
July	440,850	238,700
August	199,300	114,770
September	315,590	346,610
October	2,380,410	1,038,180
November	1,693,890	1,505,640
December	1,044,740	1,113,210
Totals	8,892,200	6,148,970

Shipments of Flaxseed.

Shipments of flaxseed from the Minneapolis market during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	108,700	46,340
February	37,570	56,030
March	27,020	137,070
April	12,120	60,760
May	25,540	21,240
June	6,970	13,980
July	16,060	26,360
August	34,250	3,320
September	10,440	6,0 0
October	299,100	80,040
November	467,970	312,720
December	117,960	160,410
Totals	1,163,700	933,270

Stocks in Warehouses.

Stocks of flaxseed in public warehouses in Minneapolis the first of every month during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	238,004	384,941
February	265,003	299,995
March	219,914	142,280
April	148,418	70,368
May	118,209	77,197
June	82,240	37,704
July	50,589	54,978
August	21,797	51,821
September	5,374	10,504
October	7,081	4,813
November	56,672	32,139
December	260,650	58,758

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THE NICHOLS CHEMICAL CO., Ltd.
MONTREAL AND TORONTO

Shipments of Linseed Oil.

Shipments of linseed oil during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	7,369,632	8,942,431
February	8,244,787	8,022,265
March	13,113,782	11,032,202
April	13,703,600	10,646,976
May	14,533,127	11,840,898
June	12,713,629	11,539,680
July	10,839,939	9,279,943
August	10,656,005	9,253,956
September	8,026,097	10,250,330
October	12,251,558	9,536,081
November	9,575,682	11,180,637
December	6,920,168	6,812,378
Totals	127,948,006	118,337,776

Shipments of Cake and Meal.

Shipments of linseed oil cake and meal from Mineaponlis during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	16,729,484	32,552,035
February	11,358,597	21,064,237
March	16,945,982	19,089,502
April	17,682,648	10,879,771
May	21,118,968	6,247,700
June	17,330,288	8,118,124
July	14,184,704	10,216,307
August	14,307,691	13,478,555
September	17,466,910	16,611,831
October	21,912,309	14,072,172
November	30,493,645	27,534,276
December	24,941,214	26,390,516
Totals	224,472,740	206,255,066

Receipts at Duluth.

Receipts of domestic flaxseed at Duluth during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	461,658	153,953
February	223,206	92,353
March	39,164	220,726
April	32,090	224,380
May	39,077	125,579
June	74,028	86,874
July	121,137	186,542
August	168,550	28,869
September	33,488	14,707
October	909,383	228,380
November	3,009,608	2,764,902
December	1,444,954	916,293
Totals	7,156,343	5,043,563

Receipts of Bonded Seed.

Receipts of bonded flaxseed during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	2,076	105,2 6
February	14,327	126,712
March	37,810	42,251
April	27,103	15,093
May	5,565	3,290
June	136,038	.....
July	1,128	.....
August	7,184	13,066
September	4,411	.....
October	56,705	2,541
November	38,100	3,832
December	103,900	1,105
Totals	434,416	313,206

Shipments from Duluth.

Shipments of domestic flaxseed from Duluth during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	28,298	98,973
February	18,202	7,723
March	22,398	.....
April	12,155	13,106
May	428,015	385
June	19,674	25,526
July	255,089	.....
August	755,425	459,987
September	422,958	918,534
Octboer	304,843	114,701
November	2,622,152	2,118,480
December	2,696,508	830,362
Totals	7,355,717	4,587,787

Shipments in Bond.

Shipments of bonded flaxseed from Duluth during the calendar year 1916, with comparisons of the year 1915, follow:—

	1916.	1915.
January	.....	.....
February	.....	1,899
March	3,122	.....
April	1,497	.....
May	10,567	29
June	13,324	.....
July	.....	.....
August	.....	.....
September	23,437	.....
October	4,161	.....
November	11,106	.....
December	.....	.....
Totals	67,214	1,928

Receipts at Winnipeg.

Receipts of flaxseed at Winnipeg during the calendar year 1916, with comparisons for the year 1915, follow. These figures are based on the Winnipeg inspection. From January 1 to September 1 an average of 1,100 bushels to the car is allowed. From September 1 to December 31 an average of 1,100 bushels to the car is allowed:—

	1916.	1915.
January	126,566	301,350
February	188,100	154,775
March	436,700	339,275
April	413,500	395,650
May	684,200	154,775
June	594,000	130,175
July	765,600	126,075
August	712,800	34,850
September	319,000	11,275
October	350,900	272,650
November	1,174,800	661,125
December	947,100	550,850
Totals	6,713,200	3,132,825

Shipments—Fort William.

Shipments of flaxseed from Fort William and Port Arthur during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	197,966	17,952
February	35,747	9,130
March	71,651	7,790
April	55,575	30,401
May	820,772	121,222
June	364,791	296,865
July	759,344	154,457
August	1,080,454	186,138
September	347,525	368,817
October	738,333	502,737
November	762,186	340,823
December	598,268	484,255
Totals	5,827,712	2,522,617

Flaxseed Exceeded $3 Mark in Duluth Market.

Taken by and large, the flax market year was controlled for the most part by the Argentine situation and is still controlled by it. What is more, it will be controlled by it until the next crop is pretty definitely settled. That there must be a material change in conditions in the South is evident. North America did her part during the past year and there is no reason to believe that she will not do it again.

During 1915 this continent fell down, but, as it turned out, the fall was not nearly as bad as was supposed. More flax kept coming out, and as the traders kept thinking, "Well, it's about over," there would be another flow, until they were all at sixes and sevens to know what to make of it. The truth was that the West, and particularly the Canadian West, had grown a great deal more flax than was supposed. The first impression of a short crop sent the prices soaring and a bull market existed for a long time, but this was later dissipated by the continual outflow of the seed and the fact that investigation by the Canadian Government revealed many more bushels in its far western territory about which nothing had been said.

In the drop that followed many got caught, and during May and June the continued fall caught many who still believed the market would come back.

Along about that time doubts began to be felt as to whether the North American crop would amount to much, and the result was that the market began to strengthen up. At this time the Argentine situation had cut no unusual figure, for it was taken for granted that it would produce about the normal 30,000,000 to 40,000,000 bushels.

Effect of Argentine Drought.

It was not until later in the season, when the Argentine crop began to develop, that it really got into the game. The fearful drought which held that country helpless and burned up its crops destroyed flax as ruthlessly as the rest, and when the stories began to come in the domestic and Canadian situation was entirely lost sight of and forgotten for the time. It was believed that the crop of this continent would amount to no more than in the previous year, figuring at the best, and when it was learned that the crop of the southern republic was being burned up there was a wild rush among crushers and speculators alike to get as much seed as they could.

Even at that time the rumor was that the Argentine would produce about 10,000,000 bushels, while the condition as reported now is far worse than that.

During the rush for seed the price of flax hit its highest mark on this market, reaching almost $3 for cash and over $3 for May.

It is now claimed on good authority that the crop of the Southern republic to more than 7,000,000 business at most and may not go over 3,000,000, according to some. It has a carry-over of about 7,000,000 bushels, while its average shipments—the demands made upon it—are 26,000,000 bushels.

Fortunately the North American crop has turned out much better than was expected and, it is claimed, even larger than the government report shows it to be. The continent will probably produce at least 24,000,000 bushels.

Acreage and Production.

The following table is compiled from figures published by the United States Secretary of Agriculture:—

	Acreage.	Production in bushels.	Farm value per bushel, Dec. 1.
1916	1,605,000	15,459,000	$2.48
1915	1,367,000	13,845,000	1.74
1914	1,885,000	15,559,000	1.26
1913	2,291,000	17,853,000	1.23
1912	2,851,000	28,073,000	1.15
1911	2,757,000	19,370,000	1.82
1910	2,467,000	12,718,000	2.32
1909	2,083,000	19,513,000	1.53

Following is a tabulated statement of the range of prices in cash flax and the various options, by months, receipts and shipments in the several Western markets, stocks in store, and the like:—

The monthly range of closing prices for cash seed on the Duluth market in the calendar year of 1916, compared with the previous year, follows:—

Closing Prices for 1915-1916.

	1916	1915
January	$2.17¾@2.42¾	$1.63½@1.93
February	2.23 @2.34	1.84½@1.91½
March	2.15¾@2.32½	1.84½@2.09
April	2.01 @2.19¾	1.89¾@1.98¼
May	1.84½@2.03¾	1.91 @2.02¼
June	1.76 @1.86	1.70½@1.85½
July	1.80 @2.11¼	1.53 @1.76¼
August	2.05 @2.26¾	1.58½@1.68
September	2.02¼@2.31	1.62 @1.82½
October	2.43 @2.72	1.76 @1.90¼
November	2.65¾@2.94½	1.87½@2.12¾
December	2.79 @2.96	2.00¼@2.20½

Prices for Cash Seed.

The monthly range of prices for cash seed at Minneapolis in the same year, with similar comparisons, follows:—

	1916	1915
January	$2.14¾@2.41½	$1.59½@1.94
February	2.24 @2.38¾	1.80¾@1.92½
March	2.14¾@2.35½	1.81¼@2.06¼
April	1.99 @2.22¼	1.85 @1.97¾
May	1.84 @2.09¼	1.87 @2.00¼
June	1.73½@1.89	1.68¼@1.86¾
July	1.77 @2.12	1.52½@1.75½
August	2.03 @2.28	1.56½@1.74½
September	1.99¾@2.32	1.59½@1.87¼
October	2.39 @2.70	1.73 @1.91
November	2.59¾@2.93¾	1.84½@2.11½
December	2.76½@2.94	1.97¾@2.21

Closing Prices May Seed.

The monthly closing prices of May seed at Duluth, compared with the prices in year, follows:—

	1916	1915
January	$2.21¾@2.44¾	$1.63¼@1.94
February	2.25 @2.36	1.85½@1.91¾
March	2.15¾@2.32	1.85¼@2.10
April	2.01 @2.19¼	1.90¾@1.99¼
May	1.85 @2.04¼	1.91 @2.02
June	..... @—	..... @—
July	..... @—	..... @—
August	..... @—	..... @—
September	2.05½@2.33	1.75½@1.86½
October	2.43 @2.71	1.77 @1.89¼
November	2.66¾@2.98	1.89¼@2.11¼
December	2.83 @2.98	2.04¾@2.24

Closing Prices July Seed.

The monthly range of closing prices for July seed during 1916, as compared with the same option during the previous year, follow:—

	1916	1915
January	$2.30¼@2.44¼	—@—
February	2.25 @2.36¾	$1.83 @1.88¾
March	2.15½@2.32½	1.86 @2.11½
April	2.03 @2.16¾	1.93 @2.02
May	1.95½@2.06¾	1.93 @2.04¾
June	1.76½@1.87	1.70½@1.87
July	1.80 @2.11	1.53 @1.76¼
August	—@—	—@—
September	—@—	—@—
October	—@—	—@—
November	—@—	—@—
December	—@—	—@—

Closing Prices September Seed.

The monthly range of prices for September seed at Duluth, as compared with those of the previous year, follows:—

	1916	1915
January	—@—	—@—
February	—@—	$1.85½@1.92
March	—@—	1.85¼@2.09¾
April	—@—	1.95 @2.03¾
May	$1.80½@1.95	1.96 @2.07⅛
June	1.78 @1.87	1.74 @1.90
July	1.82 @2.11	1.54½@1.87¾
August	2.05 @2.26	1.58¾@1.68½
September	2.01¾@2.29	1.61¾@1.84½
October	—@—	—@—
November	—@—	—@—
December	—@—	—@—

October Seed.

The monthly range of prices for October seed at Duluth in 1916, with comparisons of the previous year, follows:—

	1916	1915
January	—@—	—@—
February	—@—	—@—
March	—@—	—@—
April	—@—	—@—
May	$1.77 @1.84½	$1.96 @2.05
June	1.76½@1.83	1.75¼@1.89¼
July	1.82 @2.11	1.56¼@1.80¾
August	2.06¼@2.27½	1.59¾@1.70
September	2.02½@2.29	1.62½@1.82¾
October	2.41 @2.27	1.75 @1.89¼
November	—@—	—@—
December	—@—	—@—

November Seed.

The monthly range of closing prices for November seed in this market in 1916, with comparisons of 1915, follows:—

	1916	1915
January	—@—	—@—
February	—@—	—@—
March	—@—	—@—
April	—@—	—@—
May	$2.86 @2.92	—@—
June	1.74 @1.90	—@—
July	1.74½@1.82	—@—
August	1.82 @2.00	$1.57½@1.80
September	2.06¼@2.27½	1.59¾@1.71
October	2.03 @2.29½	1.63 @1.80½
November	2.41 @2.70	1.73½@1.87½
December	2.66¾@2.92	1.86½@2.08¾
	—@—	—@—

December Seed.

The monthly range of closing prices for December flax on this market in 1916, as compared with those of the previous year, follows:—

	1916	1915
January	—@—	—@—
February	—@—	—@—
March	—@—	—@—
April	—@—	—@—
May	—@—	—@—
June	$1.78¾@1.82	—@—
July	1.81¼@2.06	$1.57½@1.62½
August	2.05¼@2.25½	1.57¾@1.71
September	2.02¼@2.28½	1.62¾@1.79
October	2.38½@2.66½	1.71¾@1.85
November	2.63½@2.91½	1.84¾@2.07¾
December	2.76 @2.92½	1.98¼@2.19

Receipts by Months.

Receipts of flax, by months, in Duluth during the past year, compared with 1915:—

	1916. Bushels.	1915. Bushels.
January	461,658	153,953
February	223,206	92,352
March	39,164	220,726
April	32,090	224,380
May	39,077	125,579
June	70,028	86,874
July	121,137	186,542
August	168,550	28,869
September	33,488	14,707
October	909,383	159,703
November	3,009,609	2,764,912
December	1,444,954	917,398
Totals	7,156,413	5,356,769

Shipments of Flax.

Shipments of flax from Duluth during the past year, with the usual comparisons, follow:—

	1916. Bushels.	1915. Bushels.
January	28,298	98,973
February	22,398	7,723
March	12,155	.....
April	428,015	.....
May	19,674	385
June	25,089	25,526
July	755,425	.....
August	755,425	459,987
September	422,958	918,534
October	304,843	106,680
November	2,622,152	2,118,480
December	2,696,508	830,362
Totals	8,092,940	4,589,656

Receipts at Minneapolis.

Receipts of flax at Minneapolis in 1916, compared with those of 1915, were as follows:—

	1916. Bushels.	1915. Bushels.
January	319,470	590,010
February	398,800	443,200
March	810,160	384,250
April	485,880	142,200
May	440,250	76,800
June	362,860	146,400
July	440,850	238,700
August	199,300	114,770
September	315,590	346,610
October	2,380,410	1,038,180
November	1,693,890	1,505,640
December	1,044,740	1,058,690
Totals	8,892,200	6,094,450

Shipments from Minneapolis.

Shipments of flax from Minneapolis during 1916, compared with those of 1915, were as follows:—

	1916. Bushels.	1915. Bushels.
January	108,700	46,340
February	37,570	56,030
March	27,020	137,070
April	12,120	60,760
May	25,540	21,240
June	6,970	13,980
July	16,060	76,360
August	94,250	3,320
September	10,440	6,000
October	229,100	80,040
November	467,970	312,720
December	117,960	.....
Totals	1,090,700	.....

Receipts at Chicago.

Receipts of flax at Chicago during the year just ended, compared with those of 1915, were:—

	1916. Bushels.	1915. Bushels.
January	36,000	31,000
February	30,000	21,000
March	54,000	5,000
April	38,000	.....
May	204,000	4,000
June	.....	187,000
July	19,000	1,000
August	57,000	1,000
September	188,000	261,000
October	158,000	207,000
November	176,000	126,000
December	.....	448,000
Totals	.....	1,292,000

Shipments from Chicago.

Shipments from Chicago, together with figures for comparison, were:—

	1916. Bushels.	1915. Bushels.
January	.....	8,000
February	1,000	1,000
March	2,000	3,000
April	1,000	.....
May	8,000	2,000
June	10,000	.....
July	2,000	.....
August	.....	.....
September	1,000	.....
October	.....	4,000
November	1,000	1,000
December	.....	14,000
Totals	.....	33,000

Shipments at Port Arthur.

Shipments of flax at Port Arthur-Fort William this year and last were as follows:—

	1916. Bushels.	1915. Bushels.
January	183,199	13,208
February	30,501	8,154
March	51,128	68,983
April	80,938	30,401
May	756,496	117,868
June	365,902	290,791
July	924,328	155,074
August	950,477	175,068
September	470,656	370,867
October	680,459	512,260
November	750,645	328,956
December	1,160,523	504,052
Totals	6,405,252	2,585,318

Receipts at Port Arthur.

Receipts at that combined point last year and the year before were as follows:—

	1916. Bushels.	1915. Bushels.
January	186,659	105,659
February	114,142	88,560
March	121,990	197,882
April	192,337	390,154
May	871,308	150,105
June	586,853	137,062
July	665,706	87,116
August	868,217	47,358
September	341,389	11,938
October	211,435	175,018
November	1,194,338	584,567
December	1,104,896	612,970
Totals	6,659,799	2,656,629

Stocks in store in Duluth and Minneapolis on the last day of each month in 1916 and 1915 were as follows:—

Stocks in Store.

	1916. Bushels.	1915. Bushels.
January	1,438,278	896,000
February	1,658,669	906,000
March	1,709,063	869,000
April	1,754,604	1,095,000
May	1,360,604	1,223,000
June	1,537,732	1,284,000
July	1,635,965	1,471,000
August	1,056,217	1,053,000
September	646,721	149,000
October	1,303,805	266,000
November	1,210,000	916,000
December	1,126,004	1,003,000

MINNEAPOLIS.

	1916. Bushels.	1915. Bushels.
January	265,003	385,000
February	214,731	300,000
March	148,418	142,000
April	118,209	74,000
May	82,240	77,000
June	50,569	38,000
July	21,797	55,000
August	5,374	52,000
September	7,081	36,000
October	56,672	8,000
November	249,569	32,000
December	327,890	238,000

PORT ARTHUR-FORT WILLIAM.

Stocks in store at Port Arthur-Fort William on the last day of each month in the two years concerned were as follows:—

	1916. Bushels.	1915. Bushels.
January	784,128	775,000
February	867,769	855,000
March	962,709	1,044,000
April	1,069,629	1,404,000
May	1,184,440	1,426,000
June	1,403,351	1,399,000
July	1,146,729	1,206,000
August	1,064,579	1,113,000
September	964,272	756,000
October	469,395	419,000
November	913,085	672,000
December	1,150,757	781,000

Canadian Flax Crop Small, of High Quality.

Flaxseed produced in Western Canada during the year was superior in oil content to the crop of the previous year. The demand was urgent so far through the season, as the amount carried over was very small in the visible supply.

Flax crushers, it is said, ran their mills rather sparingly and have moderate quantities in private storage. A similar condition exists in the volume carried in public storage.

While the demand for flaxseed is limited, there seems to be no prospects of securing enough to meet the demand. Since 1912 the area in both Canada and the United States has been gradually decreasing. For three years past it has been insufficient for domestic necessities. Had it not been for the Argentine shipments to the country to the south, made by the greatly decreased demand from Europe because of the war, the world would have been up against famine conditions in flaxseed more than eighteen months ago, is the opinion of many grain men in Winnipeg and Western Canada.

These high figures in the present season are suggestive of the sentiment of

HOWARD E. YOUNG, President JOHN S. YOUNG, Sec'y and Treas.

J. S. YOUNG & COMPANY

EXTRACT MANUFACTURERS

FLAVINE, QUERCITRON, SUMAC & MYROBALAN

HANOVER, PA.

Gentlemen:—

We take much pleasure in advising that we are at last in position to accept your valued orders covering 51° **LOGWOOD EXTRACT** for shipment after January 15th, 1917.

We have been manufacturing Logwood Extract since March, 1916, and have decided to market same direct to the trade in the same manner that we market our **QUERCITRON BARK** and **SUMAC EXTRACTS** and **FLAVINE.** We will be more than glad to receive your valued inquiries, which shall have our careful and prompt attention.

Might advise that this extract will be manufactured in Baltimore by our friends, The J. S. Young Company, of that city, for whom we are the selling agents, and we believe that their reputation and ours will be a sufficient guarantee that the extract will be as good **LOGWOOD EXTRACT** as can be produced and as uniform in composition as our scientific staff can insure.

We thank you for your past patronage, and earnestly trust to receive your valued business in the future.

Yours very truly,

J. S. Young & Company.

January Fifth,

Nineteen Hundred and Seventeen.

shortage anticipated before another crop, owing to the loss of so much of the Argentine crop this season, while a year ago large quantities came to this country from the Southern republic.

At the present time Canada is confronted with supplies from the 1916 crops of Canada and the United States, which it is estimated are only slightly, if any, larger than what the 1915 crop provided. The crop that year was insufficient for domestic needs by nearly 15,000,000 bushels, which quantity was supplied by Argentine. The highest estimate of export possibilities from Argentine during 1917 are 17,000,000 bushels, while other estimates have it ranging down as low as 6,000,000 bushels.

In addition to its exports to the United States, the Southern republic shipped 17,000,000 bushels to Europe in 1916. The total European supply for the year is said to be more than 30,000,000 bushels, the other 13,000,000 bushels coming from India, whose new crop is harvested in March. The crop of flax to be produced from this latter country is estimated much below last year's crop.

In view of the prospective situation it would seem that Canada could produce its present year's area of 650,000 acres by two and a half or three times and still be short in the demand.

Much concern exists as to the future supply of seed available in the Canadian Northwest. Supplies are small, but consumers have been reluctant to take up more than could tide over urgent necessities. Meanwhile the values of the products achieved a greater advance—in the case of cakes owing to their extreme scarcity and in that of oil by some development in the demand, although it could not be said as very aggressive. In recent months there has been more disposition to sell both by first and second hands, chiefly due to the improved shipment prospects and speculators unloading their holdings.

On the local flax market since the beginning of 1917 prices have been irregular. Small shorts have covered, causing firmness. Nothing particularly new has developed in the general situation. Operators, impressed with dullness in oil, are disinclined to go into new deals, and only necessary business is being filled. Receipts of flax in Winnipeg have been light as elsewhere. Elevator stocks are accumulating moderately. Little or no shipping of any account is done.

Flax inspections in the Canadian western grain division from September 1 to December 31, 1916, amounted to 2,868,800 bushels, as against 1,636,450 bushels during the same period a year previous.

Amount of flax actually received at Fort William and Port Arthur from September 1 to December 28, 1916, amounted to 2,630,063 bushels, as against 1,354,765 bushels during the same period a year previous. The actual shipments from Fort William and Port Arthur, the terminals, from September 1 to December 28, 1916, amounted to 2,441,312 bushels, while during the same period in the previous year 1,696,630 bushels were reported.

Amount of flax in store in the country (interior) elevators west of Winnipeg in Western Canada January 3, 1917, were as follows:—C. P. R., 429,917 bushels; C. N. R., 351,520 bushels; G. T. P., 97,010 bushels, making a total of 878,447 bushels. A year ago there were 246,102 bushels in store in country elevators, as follows:—C. P. R., 120,027 bushels; C. N. R., 101,075 bushels; G. T. P., 25,000 bushels.

UNUSUAL PRICE CHANGES FEATURE OF LINSEED OIL AND CAKE IN NEW YORK

Small Domestic Crop, Scarcity of Tonnage for Ocean Shipments, and Consequent High Freights Directly Affected Conditions in the United States.

A review of the linseed oil market for the year shows that price fluctuations were frequent and were of broader scope than in the year preceding. In fact, prices changed to a greater degree than had been the case for some years. A strong situation existed at the beginning of the year. To start with, the domestic crop of flaxseed in 1915 was not large enough to fill the requirements of the oil trade, and this made it imperative to seek supplies in other countries. Naturally, the Argentine was relied upon to the largest extent, but tonnage for moving seed from that country was scarce and ocean freights were far above normal, hence the price for seed laid down at New York was high and oil values were based accordingly. As there were but small stocks of domestic seed in the country, the position of foreign markets became more important.

Under the increased costs which followed as a result of high transportation charges, the tendency of oil prices was upwards at the beginning of the year, and substantial gains were recorded for the month of January. The shipping situation also became a factor in the cake market, as difficulty was found in making deliveries from this country to consuming markets in Europe.

Strong Market in First Quarter.

A strong market for oil was thus created over the first quarter of the period. Demand for oil in April was quiet, but stocks at crushing points were small and prices held on a fairly steady basis.

During May local conditions had some effect, as consumption of oil was decreased by smaller painting operations, which were made necessary by a strike of 10,000 painters in the metropolitan district. Encouraging reports regarding an increased flax acreage in the Northwest also were heard at this time and acted as a bearish factor on prices.

In June and the first part of July the market fluctuated but slightly, and the trade in general waited for definite news regarding the growing crop.

As July advanced, crop news became bullish and prices for seed and oil quickly responded. When it was seen that the crop in this country and in Canada would not be large enough to take care of requirements, crushers became more eager to absorb supplies of seed and oil was held in a very firm position.

Bullish Reports from Argentina.

The most bullish factor of the year, however, was yet to develop. This consisted in reports to the effect that the Argentine crop was a practical failure as drouth had killed the plant. With the verification of these reports, prices went to the highest levels recorded in years and at one time in November local crushers were asking 98 cents per gallon for oil in car lots.

Prices fell off from that level before the end of the period with high returns from cake a prominent factor. Sentiment in the trade at the close of the period was bullish, as the marked scarcity of seed for the world's markets is expected to create a situation wherein prices must go to higher levels before another crop can be raised. Owing to the inability of reckoning with any accuracy the stocks of seed and oil carried over in private store and in the hands of consumers, it is impossible to fix the oil consumption in any given year.

The paint trade was not a heavy consumer in the early part of the year, but later took on normal amounts and demand from other trades was good also, so that total consumption for the year was not far from the usual standards.

Linseed Meal Prices.

Prices for linseed meal in Eastern markets are not important as most of the by-product sold is in the form of cake. Western markets, however, reported a good demand at times for meal and good prices were realized. Sales of cake for export were made in January on a basis of $38.50 per ton. The market soon weakened, with stocks piling up owing to scarcity of tonnage for shipping, and with the usual slowing up in demand in the spring months prices went down until $27 per ton became the quotation in May, and at times the demand was so quiet and tonnage so high in price that values at New York were nominal, and any selling pressure would have caused sharp breaks in the quoted price. Better inquiry from abroad strengthened the market from June on, and late in the year the highest prices reached in years were recorded. In December sales of cake were said to have been made as high as $50 per ton, though the quoted price did not reach that level.

New York Prices, Carloads, Spot.

The following table shows the prices at which car lots were quoted on spot in the New York market on each Saturday of the year, together with comparisons:—

	1916.	1915.	1914.
January 8	$0.68	$0.48	$0.48
January 15	.72	.53	.49
January 22	.74	.59	.49
January 29	.74	.59	.49
February 5	.72	.57	.48
February 12	.74	.56	.48
February 19	.75	.56	.49
February 26	.77	.55	.50
March 4	.77	.54	.50
March 11	.78	.55	.50
March 18	.78	.58	.51
March 25	.77	.60	.51
April 1	.76	.59	.51
April 8	.77	.59	.51
April 15	.76	.59	.51
April 22	.76	.60	.50
April 29	.76	.61	.50
May 6	.75	.62	.50
May 13	.72	.65	.50
May 20	.71	.65	.49½
May 27	.69	.65	.49½
June 3	.67	.64	.49½
June 10	.66	.63	.50
June 17	.65	.61	.50
June 24	.64	.57	.51
July 1	.63	.57	.51
July 8	.64	.54	.51½
July 15	.69	.54	.51½
July 22	.68	.53	.53
July 29	.70	.53	.57
August 5	.71	.51	.59
August 12	.72	.50	.58
August 19	.72	.50	.58
August 26	.72	.50	.59
September 2	.70	.52	.58
September 9	.70	.52	.57
September 16	.69	.51	.56
September 23	.72	.51	.55
September 30	.76	.55	.51
October 7	.82	.55	.49
October 14	.82	.56	.46
October 21	.87	.58	.45
October 28	.89	.58	.44
November 4	.90	.58	.44
November 11	.97	.60	.44
November 18	.95	.64	.46
November 25	.96	.63	.46
December 2	.92	.61	.46
December 9	.95	.61	.45
December 16	.92	.61	.45
December 23	.92	.61	.48
December 30	.92	.64	.48

High and Low Spot, New York.

The following table gives the high and low price quoted for oil on spot in the New York market, together with comparsons:—

	1913.		1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.	H.	L.
Jan.	47	42	49	48	59	48	74	66
Feb.	49	45	50	48	56	54	77	71
Mar.	45	43	51	50	60	55	78	77
April	48	42	51	50	61	58	77	76
May	46	44	50	49½	65	62	75	68
June	46	44	51	50	63	57	67	63
July	49	46	57	51½	54	52	70	63
Aug.	52	48	59	58	52	50	72	70
Sept.	50	47	57	51	55	51	76	67
Oct.	47	45	49	44	58	55	90	76
Nov.	48	45	46	44	64	60	97	90
Dec.	49	47	48	46	64	61	95	92
Year	52	42	59	44	65	48	97	63

Crop Estimates by Months.

Official estimates on the domestic crop of flaxseed, as reported monthly, compare as follows:—

	Acreage.	Condition. Per cent.	Yield per acre. Bush.	Total yield. Bushels.
July 1	1,591,000	90.3	9.1	14,000,000
Aug. 1	1,591,000	84.0	8.9	13,845,000
Sept. 1	1,591,000	84.8	9.4	14,895,000
Oct. 1	1,591,000	86.2	9.7	15,411,000
Nov. 1	1,591,000	...	9.6	15,300,000
Dec. 15	1,605,000	...	9.6	15,459,000

Import and Export Figures for 1916.

The following figures show the import and export trade in linseed oil for the crop year from September 1 to August 31:—

IMPORTS OF LINSEED OIL DURING CROP YEAR.

	Gallons 1914-15.	Gallons 1915-16.
September	81,722	760
October	128,650	.....
November	16,647	14,941
December	100,003	5,167
January	14,423	13
February	22,538	3,571
March	3,812	3,066
April	4,241	120
May	7,274	10,718
June	3,614	20
July	63	9,011
August	11,629	3,052
	394,616	50,519

EXPORTS OF LINSEED OIL DURING CROP YEAR.

	Gallons 1914-15.	Gallons 1915-16.
September	20,288	33,072
October	21,849	51,956
November	66,666	47,486
December	17,633	63,422
January	25,225	65,997
February	896,196	63,800
March	37,950	80,018
April	39,222	65,784
May	22,659	69,945
June	33,121	83,552
July	35,263	74,036
August	42,655	67,933
	1,259,727	797,001

Imports for Crop Years 1914-1915, 1915-1916.

Imports of flaxseed for the crop year, from September 1 to August 31, were as follows:—

	Bushels 1915-16.	Bushels 1914-15.
September	1,361,087	1,118,040
October	1,277,061	1,240,780
November	1,768,729	543,423
December	1,239,874	618,610
January	693,506	418,335
February	927,054	794,454
March	465,425	701,752
April	626,700	458,936
May	1,411,068	1,630,159
June	1,602,119	1,769,576
July	1,887,037	1,809,061
August	1,165,245	1,497,609
Totals	14,424,875	12,570,725

Exports for Crop Years 1914-1915, 1915-1916.

Exports of flaxseed for crop year, from September 1 to August 31:—

	Bushels 1914-15.	Bushels 1915-16.
September	11	186
October	19	150
November	12	148
December	37	158
January	219	62
February	1,028	24
March	376	1,041
April	674	73
May	988	63
June	....	68
July	359	61
August	271	58
	3,994	2,098

Chicago Linseed Oil Market Had Quiet Year.

The demand in the linseed oil market here was less than normal in 1916 because of the higher prices that prevailed. The falling off in demand as compared with 1915 was probably 15 or 20 per cent. The higher prices were due to a world shortage of flaxseed. The crop in the United States is about the same as the preceding year, but that of Canada will be considerably less, while in Argentina, the greatest producer of flaxseed in the world, there has been a heavy falling off of the crop. The price of linseed oil, cake and meal, as a result, has increased about 50 per cent. since 1915.

Conditions in the Chicago market were largely typical of the business in general last year. Buyers here bought mostly in a hand-to-mouth manner. The paint grinders were an exception, as they bought to some extent for deferred shipment, although not nearly so heavily as usual.

Dealers here are anticipating a very heavy trade in the ensuing year for all flaxseed products and expect that prices will be well maintained, particularly on linseed oil, during the spring and summer months, owing to short supplies of that commodity.

Range of Oil Prices—1916.

The range of prices of linseed oil in the Chicago market for the year 1916 was as follows:—

1916.	Low.	High.
January	67	74
February	72	77
March	75	78
April	73	76
May	64	74
June	62	65
July	62	71
August	69	73
September	67	76
October	76	90
November	90	98
December	92	94
Range for 1915	62	98

Range of Meal Prices—1916.

The range of prices in the Chicago market for linseed oil meal for the year 1916 was as follows:—

1916.	Low.	High.
January	36.50	38.00
February	37.00	37.00
March	32.00	37.00
April	29.00	32.00
May	28.00	30.00
June	30.00	31.00
July	31.00	32.00
August	33.00	37.00
September	37.00	38.00
October	38.50	42.00
November	42.00	46.00
December	45.00	46.00
Range for 1915	28.00	46.00

London Linseed Oil and Cake Prices High at the Close.

Linseed oil steadily declined until early autumn when a rapid recovery set in, very high prices being paid in December.

Linseed Oil Spot Prices in London.

	1916. Ton. £ s. d.	1915. Ton. £ s. d.
January	43 15 0	23 5 0
February	43 0 0	28 0 0
March	43 15 0	30 0 0
April	38 10 0	35 10 0
May	38 0 0	31 10 0
June	35 10 0	29 2 0
July	34 0 0	26 5 0
August	37 0 0	25 5 0
September	36 10 0	25 10 0
October	39 5 0	27 10 0
November	46 0 0	31 15 0
December	53 0 0	33 0 0
Close of year	50 15 0	41 5 0

Linseed Cake, London Made, Spot.

	1916 £ s. d.		1915 £ s. d.	
January	12 12 6	@12 15 0	9 17 6	@10 0 0
February	13 5 0	@13 10 0	11 0 0	@11 2 6
March	12 15 0	@12 17 6	11 0 0	@11 5 0
April	11 5 0	@11 10 0	10 0 0	@10 2 6
May	12 7 6	@12 10 0	9 12 6	@9 15 0
June	12 17 6	@13 0 0	10 2 6	@10 15 0
July	12 5 0	@12 10 0	10 10 0	@10 12 6
August	13 7 6	@13 10 0	11 10 0	@11 12 6
September	14 5 0	@14 10 0	11 12 6	@11 15 0
October	14 7 6	@14 10 0	11 12 6	@11 15 0
November	15 12 6	@15 15 0	11 17 6	@12 0 0
December	19 17 6	@20 0 0	12 0 0	@12 2 6
Close of year	19 17 6	@20 0 0	12 12 6	@12 15 0

Soya Beans and Oil at Hull, England.

Hull seed crushers and oil extractors have had a good year during 1916 with reasonable profits. Completed figures for the past year show that the quantity of raw material dealt with by the mills is fully equal to, if not in excess, of that of 1915. Approximately 600,000 tons of oil seeds and oil nuts have been absorbed, this large aggregate being fully one-half of all the oilseeds imported into the United Kingdom during 1916. This record entities Hull to still claim to be the foremost seed crushing and vegetable oil producing center in the British Empire.

Imports of soya beans were a little more than half of 1915. Arrivals amounted to 135,919 tons during the past in comparison with 69,945 tons for 1915. Spot values fluctuated between £14 and £15 in January £13 in April and £15 10s. from May onward until the boom set in a gradual rise until £20 was reached. Soya beans in warehouse in Hull, January 1, were reported at 9,800 qrs., as compared with 3,817 qrs. on December 1.

Soya bean oil, in good demand during the year, was generally scarce and prices fairly stable, ranging between 40s. 42s. in January, 38s. in the summer months, to 45s. in November, after this period only crushed was available and quoted nominally at 48s. to 49s. per cwt. Owing to the export prohibition of oils from Hull in 1916 no soya bean oil was exported, while 2,033 tons were shipped during 1915.

Soya cake followed closely the rise in linseed cake, the advantage being with soya, which opened the year at £11 10s. per ton and closed at £17 10s.

Regarding prospects for the coming year are not very hopeful as supplies of raw materials in consequence of the difficulty of oversea transportation and crushers do not expect much improvement in the position in this respect.

Oil of soya bean is palatable food widely eaten by the Chinese. This vegetable oil also is used in making paints, varnishes, soaps, rubber substitutes, linoleum, waterproof goods, lubricants and printing ink.

Chart Showing Derivation of Coal-Tar Colors.

The chart showing the derivation of the coal-tar colors, adapted from the coal-tar tree of H. von Brunck by Thomas H. Norton, of the Bureau of Foreign and Domestic Commerce, and published as a special supplement to the Reporter of October 2, 1916, has been reprinted on heavy paper, suitable for framing.

Copies can be procured from this office at 50 cents each, postpaid. The new edition has been published by request, as the first edition was exhausted within a week of publication.

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NEW YORK COTTONSEED MARKET FOR 1916 ABNORMAL IN PRICES AND VOLUME

Of all the years since cottonseed oil has been an industry the period under review has been the most remarkable in the annals of the trade, not only in the volume of business, but in the spectacular pyrotechnics in values and the remarkable daily changes in prices which have been of frequent occurrence this last fall. It has been a year when experience, conservatism and knowledge of the business have been a handicap rather than a help, and it has been mostly the ignorance of those who knew nothing about the business, or mere novices in same, who have most profited by the unprecedented advance in prices which has taken place.

We think it is safe to say that prices reached their high levels almost entirely through the wild speculation which has been rampant in the United States for the past year rather than the conditions of supply and demand. It is true that the consumer has been forced to buy more or less oil month by month for his immediate requirements because of the level set by speculative activity, but purchases have been, and are yet, largely from hand-to-mouth character, and the market even now is at a dangerously high level.

Wild Speculation Began September 1.

On September 1, although the advance was well on the way at that time, the new crop active months were selling at considerable premium over the spot months, and prices ranged around 10¼c. per pound. From that time on the wildest speculation probably ever seen in the history of the country, either in cotton oil or any other commodity, was rampant, until cotton oil was forced to the enormous high level of 13.11c. for the July option for contract grades of prime summer yellow on the local market. At that time it was difficut to find with a spy-glass any one who was not predicting anywhere from 15c. to 20c. a pound as the likely price of cotton oil in the near future. All sorts of wild prophecies were circulated, tending to bull the market; and as the principal speculators were those who knew nothing about the actual conditions of the cotton oil trade or business, they were not able to judge the improbability of the statements put before them by people equally ignorant of the commodity in which they were dealing so heavily. The consequence was that there were enormous speculative purchases made at these high levels, and so far these have resulted in nothing but loss to the purchasers.

We will try and set forth as concisely as possible the conditions which made it possible for the market to be forced to such levels, independently of the actual demand, which had been below normal for months past.

Short Crop Last Season.

Last season—the season of 1915-16—there was an extremely short crop, and the production of oil was in the neighborhood of only 3,000,000 barrels. As the season of the present crop progressed the prospect of a good fair crop of cotton was gradually lessened by adverse weather conditions, so that those holding oil at the end of last year got very stiff in their prices and went over into the new year with very small stocks, much below that being carried in normal small years of carry-overs. Speculation extended to every section of the cotton belt, and planters and seed speculators, together with crude mills, large and small, joined in a wild scramble for seed at unheard-of prices, until seed finally reached the abnormal price of between $65 and $75 per ton, something unheard of before in the annals of the industry. At such a price for seed the crude mills could not see anything but a loss staring them in the face if they crushed seed at those prices, and attempted to sell the products resulting therefrom at even the high prices ruling for the various manufactured products, such as cake, meal, oil, etc. The result was that many of the small mills sold out seed at a good profit to their larger neighbors and to speculators and shut down their mills, thus throwing the actual oil and seed into stronger hands financially, where it was comparatively easy for them to finance the business, and they were able to carry the products in an attempt to secure the prices which they deemed necessary.

Good Deal of Crush Held Back.

The consequence of all this was that, while the ginning of the new crop cotton was very early and heavy, a good deal of the crush was held back, and did not, and has not yet, come on the market in any great volume, and it forced those refiners who were obliged to have some oil to fill even the moderate demand which came to them from the consumers to pay unheard-of prices for their crude oil. The refiners who bought the crude and sold this (New York) market as a hedge when the month approached bought back their sales in this market, so that it would release oil in their own tanks to supply the needy consumers. Therefore no oil to speak of was delivered in this market during any of the early fall months. This, of course, enabled the speculators to get rid of their long holdings, in most cases at handsome profits. But in the majority of cases, when they sold out their holdings in the current month, they bought the futures, and, in many instances, still have the high-priced contracts on hand.

The crude mills continue to be very reluctant sellers, although it is generally conceded by those best posted in the business that there is a great deal of oil held by the mills, either in the shape of seed or crude oil, the mills selling only a little from time to time; so to speak, selling the surplus of their crush over and above what they can carry in their storage tanks.

The whole trade has been looking, for weeks and weeks, for the resumption of an active demand, but, so far, this demand has failed to materialize, and the buying still continues to be of a hand-to-mouth character.

Government Ginning Figures.

From the ginning figures issued by the government up to January 1, showing over 11,000,000 bales of cotton ginned up to that date, it is a conservative estimate to state that there will be in the neighborhood of 3,500,000 barrels of refined oil from this season's crop. Now, it is considered very doubtful by those well posted in the trade, and conservative, whether at anywheres near the present level of prices, this amount of oil can be consumed. With the export factor almost cut out of the equation and the soap trade also a small factor from now on, because what has been purchased so far this year by the soap trade has been bought at considerably under present figures, it is quite conservative to estimate that the soap trade will not use more than a third of the amount of cotton oil this year over what they bought last year, when, at the early part of the season, prices were very low, comparatively. Outside of that there have been enormous quantities of foreign oils—such as soya bean, peanut and Oriental crude—bought to come to this country. While, so far, the deliveries have not been as heavy as anticipated, owing to the difficult freight situation, there is a tremendous supply of foreign oils waiting to get into this country, both on sales already made and new offerings. These purchases have taken the place and filled the holes normally taken care of by cotton oil, and it resolved itself down to a point where very nearly the total crop this year will have to be consumed for edible purposes.

Enormous Acreage to Be Planted.

It is also almost a foregone conclusion that there will be an enormous acreage of cotton planted the coming spring, owing to the urgent demand for cotton, whether the war continues or is brought to a close, and at the prices which are ruling for cotton today, or anywheres near it, it shows the planter a tremendous profit on any cotton that he can raise. Therefore, with probably the largest acreage which we have ever had planted to be put in this spring, and with anywheres near normal weather conditions, there is promise of a pretty good-sized crop for the coming year, with a resultant increase in the seed available to be crushed, and it would be the wildest sort of speculation for any holders of oil to carry over oil into another season at these tremendously high levels. Therefore, it seems to be a question of marketing all they have, during this season, before any possible new crop can come on the market.

The condition of fats all over the world is such that no very low prices are likely for some years to come, but the present levels are above those warranted by the actual conditions of supply and demand, and have been brought about solely by the wild speculation in any and every commodity.

It would seem, from all these factors, that it would be the part of prudence for trade interests to sail very close to the wind and be governed by a mildly bearish sentiment or conviction. No attempt can be made to judge of the future by past conditions or performances in the market, as there are factors in the situation this year that were never known in business to-day. What will be the effect at the close of the present European conflict is open to various opinions. Strong arguments on both sides can be advanced, and it is by no means a one-sided question as to what prices will be after the close of the war.

Possible Effect of Cessation of War.

It being true that, for a time, considerable quantities of fats will be required by the Central Powers, particularly; on the other hand, the cessation of the war will release enormous quantities of various oils and fats which are held in part of the world where they are not needed, and are prevented from seeking markets where they are rquird, through the lack of transportation facilities. These stores will start in a steady stream to flow where they are most needed, immediately the war is over, so that it is quite on the carpet, that while immediately after the close of the war a striking advance in all foodstuffs may take place for a short time, it is also not at all unlikely that after the edge is off the appetite of the markets so sorely in need of fats at the present moment, that a recession in values will take place in all directions. The probabilities are that there will be rather a speculative scramble to buy almost any and everything, if the war should suddenly cease, but it will be another story for the speculators to market their commodities so purchased. Meanwhile, however, it may force still further sensational advances, temporarily.

There is one other factor in the situation which has tended, as much as anything, to force prices higher, and that is the enormous prices ruling for glycerine, brought about by the insatiable demand by the manufacturers of explosives, and when the war is over it is almost a sure thing that there will be a perpendicular drop in this item, which will, of course, affect all fats and greases now used by the soapmaker—more or less forcing a decline in all of the competing fats in this channel of consumption

Situation Points to Lower Prices.

We will not go into the question of statistics and prices, &c., in this article, as information along these lines will be found in another section of our issue, but to sum up the situation, as it actually exists at the present time, it is certainly mildly bearish, and points to lower values and lower prices. The only really "bull" feature in the market is the possible conclusion of peace in the next two or three months, and from the most recent developments this possibility is a very remote one, anyway, until another summer's campaign has been fought.

One can imagine a combination of circumstances which would be very bullish, such as complete failure, or large shortage in all our crops and those of other countries, but we must consider the probabilities in forming our judgment, and not remote possibilities. Furthermore, the technical situation on the New York market is a decidedly weak one, as the "shorts" have very largely covered in the last few dips the market has taken, and what "shorts" are left are largely refining interests or those who can actually deliver the oil if they so desire; while the long interest is a decidedly scattered one, and in many instances, weak financially, the contracts being held, in many cases, by those who would not or could not take delivery of oil, if it were actually tendered to them, and any important deliveries made on this market would cause a drastic decline in values, especially so if the slow and halting demand which has been in evidence for so long continues to be the rule.

Trend of Market to Lower Levels.

The market is liable to have rather violent swings up and down, but believe from the conditions that the down swings will be more frequent and the trend of the market will be toward lower levels. It appears quite evident that the top of the speculative boom in this country has been reached and passed, and our prosperity is on the way toward settling to a firmer and less inflated condition than has been the case during the last six months or a year, and with a subsidance of wild speculation, conditions of supply and demand will more nearly govern prices, which conditions have been ignored in price movements during the last six months.

The increase in speculation (as consuming demand has been under normal) during the past season is quite strongly emphasized, when we look at the sales on the New York Produce Exchange, which are officially over 7,000,000 barrels for the year ending December 31, 1916, as against a little over 4,000,000 barrels the preceding twelve months. It must be borne in mind that these official sales represent approximatly only about 75 per cent. of the actual transactions made, as probably 25 per cent. more transactions are made on the curb markets.

High and Low Price Comparison.

The appended tale will show the high and low prices of spot refined oil, per pound, and immediate shipments of prime crude oil, per gallon, during the last four years. Prices are based on closing quotations each successive week:—

Prime Summer Yellow on Spot.

	1916.		1915.		1914.		1913.	
	H.	L.	H.	L.	H.	L.	H.	L.
Jan.....	9½	8½	6¾	5¾	7¼	6¾	6¼	6¼
Feb.....	10¼	9¼	7.10	6.85	7.25	7.05	6.30	6.25
March..	10½	10¼	6.70	6.50	7¼	7¼	6.50	6.30
April...	11	10¼	6¾	6¾	7¾	7¾	7¼	6¾
May.....	11	10.70	6¾	6¼	7.35	7.00	7¼	6¾
June....	11	10¾	6¾	5.95	7⅝	7⅛	8⅛	7¼
July	11	9.20	6	6	7¼	6¾	6¾	8½
August.	9¾	9½	5¾	5.30	6¾	6¼	9⅛	8¼
Sept....	10¾	9¾	6¾	5.98	6¾	5¾	8½	7¼
Oct.....	12½	10¾	7.90	6.91	5¼	4.85	7.20	6.90
Nov....	13	12½	8⅝	7¾	6¼	5.00	7.15	7.00
Dec.....	13	12½	8.32	8.32	6	5¾	7.05	6.70
Year...	13	12¾	8⅝	5.30	7⅜	4.85	9⅜	6¼

Prime Crude Oil for Immediate Shipment in the Southeast During the Past Four Years.

	1916.		1915.		1914.		1913.	
	H.	L.	H.	L.	H.	L.	H.	L.
Jan....	61	55	43	36½	45	41¼	38½	37
Feb....	64	63½	45½	42	43½	44½	40	38¼
March..	70	64	42½	40½	47½	45	41	38½
April...	73	70	42	39½	45½	47	45	41
May....	73	69	42	39½	47½	45½	45½	42½
June....	71	69	39½	38½	47½	46½	47	45½
July..	*...	..	*...	..	47	44	55	50
Aug...	*...	..	*...	..	41	38	61	55
Sept....	69	68½	41	36	41	35	51	44
Oct.....	83	70	52	44	34½	29	44½	42
Nov....	88	83	55	49½	37	29	45½	45
Dec....	87	82	55	54	37½	36	42½	40¼
Year...	88	55	55	36½	48½	29	61	37

Above prices represent the gallon basis.

*Nominal.

HIGH AND LOW SPOT PRICES IN THE NEW YORK MARKET FOR MIDDLE WEST LARD LARD COMPOUND AND OLEO STEARINE FOR EACH MONTH DURING THE YEARS 1914, 1915 AND 1916.

Lard.

	1914.		1915.		1916.	
	High.	Low.	High.	Low.	High.	Low.
Jan.....	11	10⅝	10⅝	10½	10.50	9.90
Feb.....	10¾	10⅜	10⅝	10½	10.50	10.20
March...	10½	10⅜	10⅜	9⅝	11.75	10.20
April....	10⅜	10	9½	9⅜	12.80	11.75
May.....	9⅞	9½	9⅜	9¼	13.05	12.80
June....	9⅞	9¾	9¾	8	13.40	13.05
July.....	10	9⅜	7⅞	7½	13.40	12.75
Aug.....	10¼	9⅞	7⅞	7¾	14.80	12.87½
Sept.....	10¼	9⅜	8⅛	8	15.00	14.30
Oct.....	10⅜	9⅝	10	8⅜	17.00	15.00
Nov.....	11⅛	10	9⅝	8¾	17.40	17.00
Dec.....	10½	9⅝	9¾	9⅜	17.40	16.30
Year.....	11⅛	9½	10⅛	7¼	17.40	9.90

Lard Compound.

	1914.		1915.		1916.	
	High.	Low.	High.	Low.	High.	Low.
January	8⅝	8¼	7½	7¾	10½	9⅝
February	8⅝	8¼	7¾	7⅝	10⅝	10¼
March	8⅝	8½	7¾	7¾	11⅜	10⅜
April	8⅝	8⅜	7¾	7½	12¼	11⅜
May	8¼	8⅛	7½	7½	12¾	11⅜
June	8½	8¼	7½	7⅜	12¼	11⅜
July	8⅝	8⅜	7⅜	7	12¾	10½
August	8½	8¼	7	7	11	10½
September ...	8⅝	8½	7¾	7	12½	10½
October	7⅝	7	9⅜	8½	14⅜	12⅛
November	7½	6½	10¾	9½	15¼	14⅜
December	7½	7¼	9⅞	9½	14⅜	14¼
Year	8⅝	6½	10¾	7	15¼	9⅝

Oleo Stearine.

	1914.		1915.		1916.	
	High.	Low.	High.	Low.	High.	Low.
January	9¼	8¾	10	10	10	8¾
February	9⅜	9	10	10	10	9⅜
March	8⅝	8⅜	10	8½	11¾	9⅜
April	8⅝	8⅜	9¼	8½	11⅜	11⅛
May	8⅝	8½	9¼	8⅞	12	11⅛
June	8	8	9¼	8¼	12	10¾
July	7¾	7½	8¾	8	11	10
August	10	8	10	9	10½	10
September	11½	9⅜	9⅞	9⅝	10¾	10½
October	11½	8⅜	10½	9⅜	15	14⅛
November	11½	9	11	10½	15½	15
December	11	10	10½	9⅜	15½	15
Year	12⅛	7½	11	8	15½	8¾

Cotton Oil in Rotterdam Market, 1916.

The year opened with quotations of 53⅛ florins to 54½ florins c. i. f. Rotterdam for January-February shipment with a lively demand for choice butteroil prices running up to 56¾ florins to 60 florins c. i. f. included war risk by end of January. In February quotations advanced to 62 florins c. i. f. Rotterdam for April-May shipment and 65 florins for spot butteroil; later on prices of $24.50 to $26.30, cost and freight Rotterdam, cash New York, were asked and paid.

In March the advance continued and soon prices of $25.80@26.90 for April-May and even $27.15 cost and freight Rotterdam for June-July shipment had to be paid. In April some business in choice butteroil for April-June shipment took

High and Low Prices on New York Produce Exchange of Prime Summer Yellow Cottonseed Oil from Time Option Was Quoted Until Last Tender Day.

	1910.		1911.		1912.		1913.		1914.		1915.		1916.		1917.		
	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	
January	7.68	5.45	7.66	6.40	6.15	5.21	6.68	5.80	7.24	6.30	7.12	4.70	9.75	5.46	12.86	7.87	To Dec. 25, 1916.
February	7.62	6.18	7.62	6.76	6.15	5.26	6.37	5.83	7.32	6.42	7.15	4.88	10.00	5.56	12.95	7.95	
March	7.81	5.58	7.71	6.20	6.15	5.27	6.55	5.96	7.75	6.56	7.25	5.07	11:12	5.68	12.98	8.19	
April	7.78	7.14	7.35	6.04	6.55	5.39	7.12	6.08	7.58	7.05	7.35	5.21	11.00	6.20	12.95	9.70	
May	8.20	5.65	7.80	6.03	7.52	5.37	7.15	6.00	7.60	7.05	7.41	5.36	11.15	7.22	13.07	10.60	
June	8.08	7.78	7.35	6.17	7.38	5.49	7.76	6.13	7.63	7.08	7.41	5.78	11.10	7.86	13.03	12.04	
July	9.00	5.80	7.72	5.60	7.52	5.46	9.75	6.15	7.71	6.81	7.60	5.94	11.30	8.45	13.11	12.05	
August	10.25	7.86	7.32	5.40	7.56	5.80	9.58	6.22	7.80	6.18	7.70	5.50	11.32	8.71			
September	10.40	7.06	7.50	5.28	7.60	5.77	9.60	6.39	7.79	5.70	7.86	5.22	11.32	8.95			
October	9.10	6.67	6.54	5.25	7.54	5.65	8.87	6.30	7.49	4.75	8.12	5.27	12.95	8.30			
November	7.94	6.62	6.21	5.22	6.94	5.60	7.23	6.37	7.07	4.90	8.40	5.25	13.00	7.84			
December	7.59	6.42	6.19	5.20	6.78	5.72	7.18	6.31	7.06	4.59	8.56	5.34	12.95	7.84			

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place at 71 florins, c. i. f. Rotterdam, included war risk, and beginning May for June-August shipment at 73 florins c. i. f. and 76@75 florins for spot oil. During May and June only a limited trade in spot oil took place at 77 florins for choice oil. Beginning of July offers from America for July-September shipment ranged from 71 florins to 79 florins c. i. f. included war risk, but soon a declining tendency set in, c. i. f. quotations declining gradually during July-August to 57½ florins c. i. f., for August-September shipment, with buyers at 56 florins. September opened with offers at $11@11.25 per 100 pounds, cost and freight Rotterdam, gradually advancing to $24.50 per 100 pounds, cost and freight Rotterdam for November-January shipments and spot oil to 73 florins. End of September deals in butteroil for November-January shipment were reported at 71½@73 florins, cost and freight Rotterdam, for spot oil at 78 florins. In October prices gradually advanced to 82 florins, c. i. f. Rotterdam, for November-December shipment. In December prices for choice butteroil advanced to 86 florins c. i. f. included war risk for December-January shipment.

London Cottonseed Oil and Cake Closed at High Point.

With a view to showing the general trend of prices in London, the following record of spot prices there for crude oil in pipes and of refined in barrels taken at about the close of the first week in each month will serve:—

Spot Prices, Crude and Refined, Taken Monthly.

COTTON OIL, LONDON SPOT.

	Ton, price, 1916					
	Crude.			Ref. pale.		
	£	s.	d.	£	s.	d.
January	44	5	0	48	5	0
February	44	0	0	49	0	0
March	42	10	0	47	10	0
April	43	10	0	48	10	0
May	46	0	0	49	10	0
June	45	0	0	49	5	0
July	41	0	0	44	10	0
August	39	5	0	44	0	0
September	34	10	0	40	0	0
October	35	0	0	40	0	0
November	43	0	0	Nominal		
December	51	0	0	*Nominal		
Close of year	52	10	0	*Nominal		

*Sweet barrels, £50@£60.

Cottonseed Cake Prices.

In cottonseed cake value of best English made increased as follows, the figures again being taken towards the close of the first week in each month. Egyptian cakes opened at about £9 10s. per ton, but were not represented in the market after February:—

COTTONSEED CAKE, LONDON SPOT.

	Best English Made.					
	£	s.	d.	£	s.	d.
January	9	17	6@10	0	0	
February	10	7	6@10	10	0	
March	..	..	.@..	..	..	
April	9	7	6@ 9	10	0	
May	9	17	6@10	0	0	
June	10	7	6@10	10	0	
July	9	10	0@ 9	12	6	
August	9	17	6@10	0	0	
September	10	5	0@10	10	0	
October	10	12	6@10	15	0	
November	12	2	6@12	5	0	
December	15	17	6@16	0	0	
Close of year	16	2	6@16	7	6	

MARKET FOR OTHER VEGETABLE OILS.

Prices Highest in Years—Production Increased—Soya Imports Enormous.

COCONUT OIL.

The market for coconut oil during 1916 was even higher than in the preceding year. Importations of genuine Ceylon and Cochin coconut oil were comparatively small, owing to embargoes, but this was fully offset by larger importations from the Philippines and increased production by domestic crushers. The available supply of coconut oil, in spite of the unusual conditions prevailing as a result of the war, was practically up to normal. In view of the very high prices which obtained for other oils and fats the position of the market for cocoanut oil was at no time considered unreasonable. Coconut oil gained ground steadily in the manufacture of butter substitutes, both in this country and abroad.

The feature during the year was the increase in the production of coconut oil by Philippine and domestic crushers. Japanese interests also entered the field and throughout the year competition for business was keen. As in former years the soap makers were the principal consumers.

Production Increased in U. S.

That the production of coconut oil has increased materially in this country is indicated by the latest statistics covering imports of copra. The imports of copra into the United States for the ten months ending with October amounted to 119,235,667 pounds, as against 87,629,304 pounds for the corresponding period a year ago and 50,758,108 pounds for the same time in 1914.

In regard to the imports of both the oil and copra, the shipping situation was an important factor. Freight room from the Far East was scarce over the greater part of the year, and at different times the arrival of supplies were delayed considerably. The market for Philippine oil was especially influenced by the freight situation.

Imports of coconut oil were practically as large as in 1915. Latest figures, which cover the ten months ending with October, give the quantity imported as 56,282,867 pounds, as against 57,492,852 pounds for the corresponding period in 1915 and 48,771,155 pounds in 1914.

Market for Ceylon Oil.

The market for Ceylon coconut oil (genuine) during 1916 ranged in price from 11c. to 16c. per pound, cooperage basis. The high price obtained during April and May when freights were particularly scarce. The low price of 11c. per pound was established during the month of September when competition between domestic and Philippine producers was an important factor.

Ceylon, High and Low.

The following table gives the high and low price for each month, from January, 1914, to December, 1916, on Ceylon coconut oil, the figures being based on the closing spot quotation of each successive week:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	10½	10¼	11	10¾	13	12½
February	10¼	10	11	11	14	13
March	9¾	9½	11	10¾	15	14½
April	9⅝	9½	10¾	10¼	16	15
May	9½	9¼	10¼	9¼	16	15½
June	9½	9	9½	8¾	15½	14½
July	9½	9	9	8¾	14	13
August	13½	9	8¾	8¾	12¾	12
September	14	13	9¼	9	12	11
October	12½	10½	9¼	9¼	13½	12½
November	11½	10½	11⅜	10	14	13½
December	11	10¾	13¾	12	14½	14
Year	14	9	13¾	8¾	16	11

Note.—The prices are for cocoanut oil in barrels. In September domestic producers entered into contracts on the basis of 10½c. per pound, tank car basis.

Cochin High and Low.

Following are the high and low spot prices for Cochin coconut oil, by months, for 1914, 1915 and 1916:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	12½	11	15	14	15½	15
February	10⅞	10⅜	14½	14½	15½	15
March	10⅜	10⅜	14½	14	17	15½
April	10½	10⅜	13¼	11⅜	18	17
May	10⅜	10	11¼	10½	17	16½
June	10⅜	10½	10½	10¼	16½	15
July	11	10½	10½	10¼	15	14
August	15	10½	10½	10	13½	13
September	16	15	10½	10¼	14	13¼
October	15	13½	11¼	10½	10	14
November	14	12½	14	11	17	16
December	15	14½	15½	14¾	17	16

CORN OIL.

Average prices for both crude and refined corn oil during 1916 were the highest on record, due chiefly to the unprecedented demand for the latter. Production of corn oil was somewhat larger than in 1915, being estimated at 250,000 barrels. The scarcity of other edible oils was reflected in an active inquiry for refined corn oil, especially over the second half of the year. The fact that refiners purchased the bulk of the year's output of crude on contract greatly restricted the use of the crude for technical purposes. Crude corn oil opened the year with sellers asking from 7.85c. to 8.75c. per pound, in cooperage, car lots, f. o. b. New York. In April, following a sharp advance in competing oils, the price of crude corn oil was advanced to 10.25c. per pound. The usual dull summer period brought out temporary weakness, and in August it was possible to purchase crude around 7.61c. per pound. Prices ruled strong over the fall and winter months, advancing steadily until December offerings were meager at 12.25@12.75c. per pound.

Refined oil was influenced entirely by the course of the market for cottonseed oil. The export demand was not so good, owing to the shipping conditions, but domestic consumption increased materially. Aside from being used as an edible product refined corn oil also was purchased for technical purposes, fairly large quantities being taken by the artificial leather trade, former users of castor oil. Prices for refined corn oil in the New York market ranged from 8.45c. per pound to 14.01c. per pound, the high price obtaining in December.

High and Low, Crude.

The following table gives the high and low price of crude corn oil, by months, during 1914, 1915, and 1916:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	6.65	6.45	5.80	5.70	8.75	7.85
February	6.55	6.45	6.25	5.80	9.51	8.75
March	6.55	6.45	6.26	6.25	10.00	9.75
April	6.55	6.45	6.26	6.26	10.25	9.75
May	6.55	6.35	6.50	6.26	9.75	9.50
June	6.45	6.25	6.26	6.01	9.50	8.70
July	6.45	6.35	5.86	5.56	8.41	7.96
August	6.35	5.95	5.65	5.50	7.75	7.61
September	6.05	5.95	6.45	5.65	9.25	8.36
October	5.60	5.35	7.75	6.45	11.75	10.00
November	5.60	5.55	7.75	7.50	12.25	12.00
December	5.70	5.60	7.85	7.75	12.75	12.25
Year	6.65	5.35	7.85	5.56	12.75	7.85

High and Low, Refined.

The following tabulation shows the high and low price of refined corn oil during each month of 1915 and 1916:—

	1915.		1916.	
	H.	L.	H.	L.
January	6.75	6.55	9.40	8.45
February	7.25	6.75	10.46	9.40
March	7.25	7.25	11.11	10.46
April	7.25	7.25	11.11	10.26
May	7.50	7.25	10.81	10.61
June	7.00	6.75	10.81	10.41
July	6.35	5.95	10.41	9.16
August	6.15	6.05	9.16	8.91
September	7.15	6.15	10.61	9.86
October	8.25	7.15	12.51	10.86
November	8.25	8.00	13.51	13.01
December	8.45	8.25	14.01	13.01
Year	8.45	5.95	14.01	8.45

Note:—Prices for corn oil are in dollars and cents, per 100 pounds, car lots, cooperage basis.

OLIVE OIL.

While the rule was high prices, based upon reports of smaller crops, trading in olive oil and foots was fairly active. Prices were lowest during the first six months, but over the second half the tendency of the market was steadily upward. In some sections abroad production of olive oil was estimated as being fully 25 per cent. short of normal. The strong position of competing oils was a factor, especially throughout the last quarter of the year. Importations of denatured olive oil and olive oil foots during 1916 showed a moderate increase compared with 1915. despite the embargoes and the numerous shipping restrictions in force at primary sources of supply.

Denatured olive oil opened the year at 92c. per gallon, spot delivery in barrels. In February the market advanced to 96c., but with offerings liberal, the strength soon disappeared and prices moved downward until in July and August transactions were noted as low as 86c. and 88c. per gallon. The fall witnessed a revival in business and prices advanced rather sharply. In September importers were asking 94c. for good quality denatured oil, and by the close of the year prices ranged from $1.05 to $1.07 per gallon.

Prime green foots were irregular, stocks being normal throughout the year. The low price for the year was 9c. per pound; which obtained during the summer, with 13¾c. the highest figure for the year, and also in recent years. Some off grades sold in the New York market at 8½c. per pound and even under.

High and Low, Denatured Yellow.

The subjoined table gives the high and low prices for each month, from January 1, 1914, to December 31, 1916, with the average price for each year on denatured yellow olive oil, the figures being based on the closing quotations of each successive week:—

	1914.		1915.		1916.	
	H.	L.	H	L.	H.	L.
Jan.	85	82	95	90	92	92
Feb.	86	84	88	82	96	92
March	86	86	90	88	96	94
April	86	85	90	90	95	95
May	85	82	92	90	94	90
June	83	82	90	86	90	96
July	82	78	86	84	88	86
Aug.	1.10	78	85	82	88	88
Sept.	1.05	1.00	85	85	94	91
Oct.	1.00	95	88	85	1.05	96
Nov.	95	95	90	88	1.05	1.05
Dec.	95	90	92	90	1.07	1.05
Year	1.10	78	95	82	1.07	90

High and Low, Prime Foots.

Following are the high and low prices for prime olive oil foots, by months, for 1914, 1915 and 1916:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	7⅞	7⅞	9½	8⅝	9⅝	9½
February	7⅞	7⅞	8	7⅞	11½	9⅝
March	7⅞	7⅞	8⅝	8¼	12½	12
April	7⅞	7½	8⅝	8⅝	13¼	12½
May	7½	7¼	9	8⅝	12¼	10⅜
June	7¼	7¼	9	8¼	10⅜	10
July	7¼	7	8½	7⅝	10	9
August	11	7	8	7⅝	9	9
September	11	10	8	8	9¼	9
October	10	9¼	8⅜	8	9⅜	9½
November	9¼	9¼	9	8	10	10
December	9⅛	9	9½	9¼	10	10

PALM OIL.

Importations of palm olive oil were sub-normal and price fluctuations in the New York market were violent as a result of the British regulations affecting this commodity. Imports of palm oil for the fiscal year ending with June amounted to 40,496,731 pounds, which compares with 31,485,661 pounds in 1915 and 61,753,482 pounds in 1914. Shipments from the United Kingdom to America were only possible when buyers agreed to return the glycerine content of the oil or the equivalent at a stipulated price. These regulations were in force throughout the year with the result that purchases of palm oil were restricted to actual wants. Several direct shipments of palm oil from Africa were reported in 1916. The high prices restricted business so far as the soap makers were concerned, but the tin plate trade had to enter the market for their usual requirements for the reason that substitute commodities, such as tallow, were also very high.

There were times when stocks here were so small that trading was virtually at a standstill and quotations for all grades of palm oil were merely nominal. Quotations for Lagos oil in 1916 ranged on the spot from 8c. per pound to 20c. per pound. The extremely high prices obtained during the first quarter when the British restrictions were put into force. The low for the year obtained in September, but prices subsequently recovered, closing at 12¾@13c. per pound.

The market for the lower grades was more or less nominal throughout the year. Prime red oil ranged in price from 7½c. to 17c. per pound, trading conditions being the same as for Lagos.

High and Low, Lagos.

The following table gives the high and low for Lagos palm oil in the New York market during 1914, 1915 and 1916:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	7⅝	7⅝	8	7¼	10¼	9¼
February	7¾	7⅝	11½	9½	12	10½
March	7⅝	7¾	12½	11½	17½	12½
April	7½	7⅝	11½	10⅛	20	17
May	7¼	7½	10½	8	16	13
June	7⅛	7¼	8	6⅝	12	11
July	7	7	7	6⅝	11	10½
August	7	12	7½	6⅞	10	9½
September	10½	11½	6⅝	6½	9½	8
October	8½	9	7¾	6⅝	12	9½
November	8	8½	8½	7½	12¾	12½
December	7¼	7⅝	9	8½	13	12⅝
Year	..	..	..	..	20	8

High and Low, Prime Red.

The following table shows the high and low price of prime red palm oil (Bonny) for each month in 1915 and 1916. The quotations are based upon the closing price of each successive week:—

	1915.		1916.	
	H.	L.	H.	L.
January	7	6¾	9¾	8¾
February	11	8½	10	9¾
March	11¾	11¼	16	10¾
April	11¾	10	17	15
May	10	7¾	15	11
June	7¾	6¼	11	10
July	6¾	6¾	19	10
August	6¾	6¼	9½	8½
September	6¼	6¾	8½	7¼
October	7	6½	11	9
November	8	7	12	11½
December	8½	8	12¼	12¼
Year	11½	6¾	17	7½

PALM KERNEL OIL.

The feature during the year was the inauguration of a palm kernel oil industry in this country. Several shiploads of palm kernels were imported from Africa and crushed in the Southwest. While the total quantity of oil produced here was insignificant, yet it has opened the field, and should the war continue, it is predicted that larger quantities will be produced over 1917. Owing to the British regulations affecting the exportation of palm kernels, crushers were much hampered in securing adequate supplies. In regards to the oil market, conditions were very much the same as in 1915. England was the principal source of supply, and with the stringent export regulations in force throughout the year, shipments to the United States were small and prices as a rule were wholly nominal and high. For the fiscal year ending with June, the imports of oil amounted to 6,760,920 pounds, against 4,905,852 pounds in 1915. Under normal conditions the importations into the United States amounted to upward of 25,000,000 pounds annually. Price fluctuations for the period under review covered a range of 4¼c. per pound, the low being 11¾c. per pound and the high 16c. per pound.

High and Low Prices.

The following table gives the high and low spot quotations for palm kernel oil, by months, during the past three years:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	10½	10¼	12	11½	12⅝	11⅝
February	10¼	10	12	12	13	12¼
March	9¾	9⅝	12	11¾	15⅛	13½
April	9⅝	9¼	12	11½	16	16
May	9⅜	9¼	11½	10	16	15¾
June	9¼	8¾	10	9¾	15½	14½
July	9⅜	8⅝	9¼	9	14	13
August	13½	8⅝	9¼	8⅝	13	12½
September	13	12	8⅞	8⅝	12¾	12
October	12¾	11½	9⅛	8⅝	13½	13
November	11⅜	11½	10⅝	9¼	14	13½
December	12	11½	11½	11	14¼	13½
Year	13½	8¾	12	8¾	16	11¾

PEANUT OIL.

Production of peanut oil in the United States showed a marked increase. With all competing oils at high record levels, crushers in the Southern States were quick in taking advantage of the possibilities offered by crushing peanuts. In the State of Texas the planting of peanuts was pushed both by private interests and the government authorities, and the crop of 1916 was the largest on record. Toward the close of 1916 the peanut crushing industry was on a very sound footing, and preparations were under way to make the coming season of 1917 overshadow all previous years in point of magnitude. Prices which obtained for the oil were very high, due chiefly to the shortage in cottonseed oil and other competing oils. The year opened with crude peanut oil quoted at 64c. per gallon. Stocks were limited throughout the first quarter, and the tendency of the market was upward, so that by April

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sellers were obtaining around 74@76c. per gallon for crude. During June and July business was inactive and some weakness was in evidence, sending the market down to 72½c. per gallon. Offerings of new oil came on the market in August and September, and prices dropped further, ranging from 70c. to 72c. per gallon. Throughout the last quarter the undertone was strong, most of the output of the Southern mills having been contracted for, and prices advanced sharply. In December crude peanut oil closed at 88@90c. per gallon, with offerings scanty. The market for refined oil was firm in sympathy with the high position of crude. Prices over the year ranged from 85c. to $1.05 per gallon.

High and Low, Crude Peanut.

The following table gives the high and low price of crude peanut oil in New York for each month of 1915 and 1916:—

	1915.		1916.	
	H.	L.	H.	L.
January	70	68	64	64
February	68	65	68	66
March	68	65	74	68
April	66	65	78	74
May	66	65	78	74
June	70	66	76	74
July	65	65	75	72½
August	65	65	72	70
September	66	66	74	72
October	68	66	80	74
November	66	66	88	84
December	68	66	90	86
Year	70	65	90	72½

RAPESEED OIL.

Throughout the year there was a decided shortage in the supply of English refined rapeseed oil. The cost of seed laid down in England was abnormal, owing to the increased freight and insurance charges. The scarcity of labor abroad was also a factor. This condition brought about a very strong situation here, and prices for English brands of rapeseed oil were the highest on record. Importations of Japanese oil, however, were increased, so that the total supply of rapeseed oil available in this country was even greater than in 1915. The influence of the Japanese oil was not so noticeable in the Atlantic States, but market conditions on the Pacific coast were materially affected. The Japanese oil was inferior in quality to the English oil, and prices for the two brands differed materially. English refined rapeseed oil opened the year at 96c. per gallon, but before the first month came to a close sellers were asking $1.05 per gallon. Prices held at $1 per gallon and more throughout the first quarter of the year. Business was less active and on freer offerings from Hull prices eased off over the summer period, business passing as low as 90c. per gallon. In the fall, however, the situation again strengthened, and toward the close of December as high as $1.15 was asked for English refined oil for spot delivery, the highest price on record.

High and Low, English Refined.

Following are the high and low prices for English refined rapeseed oil, by months, for 1914, 1915 and 1916:—

	1914		1915		1916	
	H.	L.	H.	L.	H.	L.
January	62	59	71	70	1.05	.96
February	59	59	84	72	1.05	1.02
March	59	59	85	84	1.05	1.02
April	59	59	85	82	1.05	1.00
May	59	59	83	81	1.00	.98
June	59	59	82	77	.97	.95
July	59	59	76	75	.95	.95
August	85	59	76	76	.95	.90
September	85	75	77	76	.92	.90
October	75	72	82	77	.95	.92
November	72	70	86	83	.98	.96
December	71½	71	95	90	1.15	1.05

SOYA BEAN OIL.

Importations of soya bean oil into the United States for the calendar year amounted to approximately 250,000 barrels, the largest in the history of the trade. In 1915 the total importations amounted to but 50,000 barrels, and in 1914 the arrivals were even smaller. The tremendous increase in imports during 1916 was inspired by the shortage in fats and vegetable oils and the entire quantity was readily absorbed, consumers paying comparatively high prices for the material. Practically all of the oil imported came from Japan. Owing to the success of the 1916 season even greater quantities will be shipped to these shores over the coming year. Trade authorities predict that in 1917 the importations of soya bean oil will amount to approximately 500,000 barrels.

Soya bean oil met with an active demand throughout the year. Heavy speculation in this commodity was a factor. The shortage in the supply of cottonseed oil made consumers look around for other oils and fats to fulfil their needs. Soya bean oil, being the lowest in price of all competing oils, importers and consumers immediately took advantage of the situation. Owing to the unusual conditions prevailing in the freight market arrangements were entered into whereby large shipments could come to this country via Seattle and other Pacific coast points. This arrangement proved satisfactory, especially to Western consumers. The soapmakers were the principal buyers, but large quantities also were taken by manufacturers of edible oils and lard compound. Through the perfection of the hydrogenation process lard compound makers were enabled to consume large quantities. The liberal offerings of soya bean oil had little influence upon prices, which ruled high, especially toward the close of the year. The arrival of so vast a stock of soya bean oil served to check the upward tendency of the market for cottonseed and kindred oils. Imports of soya bean oil for the fiscal year ending with June amounted to 98,119,695 pounds, as against 19,206,521 pounds for the corresponding period a year ago. Latest official statistics covering imports show that for the ten months ending with October the arrival of soya bean oil into the United States amounted to 119,079,771 pounds, which compares with 16,027,255 pounds for the same time in 1915 and 11,779,574 pounds in 1914.

The year opened with soya bean oil quoted in the New York market, spot delivery, at 7¼@8c. per pound, in barrels. Prices commenced to advance in February when 8½c. was paid, and during March and April the market was established at 9@9½c. per pound. A lull in buying set in over the summer months and depressed the market. In July and August 7½c. was a nominal price. Business, however, soon picked up again, and in October the market advanced to 10@10½c. per pound, in November to 11@11½c. and in December sellers were asking from 11½c. to 12c. per pound, cooperage basis, spot delivery.

Early in the year paint makers bought soya sparingly, owing to the comparatively low market for linseed oil. In the fall the demand from these sources was more brisk, following the sharp upward movement in linseed oil.

Production of soya beans in Manchuria during the 1916-17 season is estimated at 1,500,000 tons, as against 1,250,000 tons the preceding season.

High and Low in New York.

Following are the high and low prices for soya bean oil (in barrels) which obtained in the New York market during each month for the past three years:—

	1914		1915		1916	
	H.	L.	H.	L.	H.	L.
January	6⅜	6¼	5¾	5¼	8¼	7¾
February	6¼	6⅜	6¼	5¾	8¾	8¼
March	6⅜	6⅜	6⅜	6¼	9½	8⅞
April	6⅜	6⅜	6⅜	6⅜	9¾	9
May	6⅜	6⅜	6½	6¼	9¼	8¾
June	6¼	6¼	6¼	6⅛	8½	7¾
July	6¼	6¼	6⅛	6	7⅞	7¼
August	7	6¼	6	5⅝	7⅞	7½
September	6⅝	6½	6	5¾	8⅝	7¾
October	6¼	6¼	7	6	10¼	9
November	6¼	5¼	7¾	7	11½	10½
December	5¼	5⅛	7¾	7½	12	11½
Year	7	5⅛	7⅞	5¼	12	7¼

CHINA WOOD OIL.

Imports of China wood oil were comparatively large during the year, but a scarcity of spot offerings during prolonged intervals showed that there were no accumulations. As imports were readily absorbed, it is evident that consumption was fully up to the supply. The year was noteworthy because of unusual conditions which existed. In the first place, shipping facilities were far from favorable. Scarcity of tonnage and high ocean freights were prominent factors all through the period and played an important part in maintaining values at high levels. The large part of arrivals came to Pacific coast ports, and there was a noticeable decline in the volume landed at New York and Boston direct from Chinese ports. Eastern consumers, therefore, received most of their supplies by rail from the West, and in the latter part of the year further complications were met with in the way of a scarcity of cars for moving stocks eastward. Prices for oil were comparatively high throughout the year. In addition to the initial cost at primary points, values at delivered points were increased by the added transportation rates and by the fluctuations in the silver market, which pushed up the rates of exchange. Firmness in the spot market at times was given by the scarcity of offerings, which caused a wide range in quotations for spot oil and for shipments. The lowest prices of the year were effective in January, but sharp advances were experienced in February, and, due to the difficulty in bringing stocks to this country, the situation became still less favorable to buyers, and a high level of 15c. per pound was reached in April. Reports from China early in the year stated that the high prices asked for wood oil in the latter part of 1915 led to considerable adulteration with the cheaper vegetable and mineral oil. Some of the oil reached this country in 1916, and at times this led to a difference in the prices quoted, with quality as the determining factor. Sales of adulterated oil were put through considerably under what was conceded to be the price for pure oil. In the latter part of the year trading was largely confined to futures owing to the lack of supplies on spot, and, owing to the difference in price between spot and shipments, buyers would not take the former unless in actual need of supplies.

Spot Prices for China Wood Oil.

	1915.	1916.
January	6¼@6½	9 @11
February	6¼@6⅝	10¾@14
March	6¼@7	13 @14
April	6¼@6⅝	14 @15
May	6¼@6¾	14 @14¼
June	7 @7⅛	12 @14
July	6¾@7¼	11½@12½
August	6¾@7¼	10½@11½
September	6⅝@7½	10¾@12
October	6¾@7½	11¾@12
November	7 @8¼	11¾@12
December	8¼@9½	12 @12½

Liverpool Palm Oil Statistics.

Liverpool palm oil statistics for the last three years follow:—

	1916 Tons.	1915 Tons.	1914 Tons.
Stock Dec. 31	12,863	10,043	3,507
Imports during Dec.	5,537	4,091	6,097
Imports Jan. 1 to Dec. 31	58,892	60,332	62,011
Deliveries during Dec.	6,689	5,343	7,179
Deliveries Jan. 1 to Dec. 31	54,569	53,796	61,765
Exports Jan. 1 to Nov. 30	17,027	37,396	42,507

ANIMAL AND FISH OIL PRICES HIGHEST ON RECORD DURING YEAR JUST CLOSED

New York Market.

COD OIL.

The tendency of the market for Newfoundland cod oil was upward throughout the year, closing at the highest point attained in recent years. In previous years the bulk of the business was placed at prices ranging from 36c. to 42c. per gallon for pure tanked oil, f. o. b. New York. In 1916 few contracts were placed under 60c. per gallon, and in many instances large buyers were forced to pay from 65c. to 75c. per gallon for contract lots. Toward the close some holders would not shade 80@82c. per gallon, and in fact spot business actually passed at these high record levels.

That prices would be high was generally regarded as a certainty, owing to the war conditions, but that the market should rise to 80c. surprised even the oldest member of the trade. The failure of the menhaden catch was a factor in the market, but this was of secondary consideration compared with the radical changes which were inaugurated in the fish oil industry of Newfoundland. In former years the production of technical cod liver oil was of prime importance in Newfoundland, but since the price of medicinal Norwegian cod liver oil has risen to almost prohibitive figures, the Newfoundland producers bent all of their efforts in turning out the high grade article, thereby curtailing the output of the technical oil. To just what extent the technical oil industry of Newfoundland has suffered through this departure is best indicated by the figures of production. In 1915 the production of tanked cod oil was estimated at close to 20,000 barrels; trade authorities at the close of 1916 placed the total output for the year at less than 10,000 barrels. The heavy demand for leather from the belligerents brought both Canadian and domestic tanners into the market, despite the high prices obtaining. The law regulating all shipments of cod oil from Newfoundland by the government, which went into effect late in 1915, continued in force throughout 1916.

The year opened with prices holding around 62@64c. per gallon. Business early in the year was quiet and prices unsettled, declining to 58@60c. in June and July. At this period buyers looked for prices to decline further, believing that the fish oil production would show a substantial gain over 1915. As this was not the case, and with offerings of cod oil from Newfoundland comparatively light, prices commenced to move upward rapidly, so that by September business was passing at 65c. per gallon. Before the close of October 75c. was paid for contract lots, and at the close of the year little oil was offering below 80@82c. per gallon, with the undertone strong, due to the sold up condition of the market.

High and Low in New York.

The following table shows the high and low prices of Newfoundland cod oil in the New York market for each month during 1914, 1915 and 1916:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
Jan.	39	39	37	36	64	62
Feb.	39	39	40	37	62	62
March	39	39	45	40	62	62
April	39	39	45	44	63	62
May	39	38	47	44	62	62
June	38	38	50	47	60	60
July	36½	35½	50	48	60	58
Aug.	38	36½	48	45	62	58½
Sept.	36½	34½	45½	45	65	64
Oct.	35	34½	50	45½	76	68
Nov.	36	35	60	50	78	76
Dec.	36	36	62	60	80	78

DEGRAS.

Owing to the high freight charges and increased cost of production prices for degras over 1916 were very high. Under normal conditions the market for ordinary quality English degras ranges in price from 3c. to 4c. per pound, but in 1916 the market fluctuations covered a wider range, 6¼c. per pound being the low price and 8c. the high for the year. Shipments from England came forward irregularly, yet the total importations were about normal. Production of degras in this country, which is small compared with England, was up to the average, according to trade authorities. A feature during the year was the increased production of neutral degras in this country. Prior to the war practically all of the neutral degras consumed here came from Europe and for a time prices for extra quality neutral held around $1 per pound and even higher. Owing to the augmented production, however, the market eased off, closing at 30@40c. per pound, according to quality and seller.

High and Low in New York.

The high and low price per pound for English degras in each month of 1914, 1915 and 1916 follows:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	3½	3⅛	5	4⅝	7	6¾
February	3¼	3⅛	5⅝	5	7¼	6¾
March	3⅛	3⅛	6½	5¾	7½	7¼
April	3⅛	3	7¼	6¾	8	7⅜
May	3¼	3¼	6¾	6½	8	7⅜
June	3¼	3¼	6½	6	8	7¼
July	3¼	3½	6¼	6	7	6½
August	4½	3½	6¼	6	6¾	6½
September	4½	4¼	6½	6¼	7	6¼
October	4⅝	4⅛	6½	6¼	7	6½
November	4½	4½	6½	6½	7	7
December	4⅝	4½	6½	6½	7	7

HERRING OIL.

The herring catch in the Chesapeake in 1916 was a failure, considering the amount of oil produced. Total production was placed at approximately 250 barrels, the bulk of which changed hands around 55c. per gallon, in cooperage, f. o. b. Baltimore.

LARD OIL.

The scarcity and high prices for pressing stock sent the market for all descriptions of lard oil to new high record levels. The shortage of fats and oils in Europe brought out a good export inquiry, despite the high position of the market, and transactions during 1916 were even greater in volume than in 1915. Lard in the Chicago market sold at 17c. per pound and over, which sent other fats and raw materials for making lard oil to such high levels that many producers were only willing to enter into spot and short-time contracts. Prices were largely nominal throughout the year. The bulk of the business noted was in the off grades. Prime lard oil opened the year at 82@94c. per gallon. An upward movement in raw materials soon set in and prices for lard oil were advanced in sympathy. In May sellers were asking $1.05 per gallon for strictly prime oil, and by September $1.10 was considered an inside price. The highest prices obtained in November and December, when nominal prices ranged from $1.30 to $1.40 per gallon.

High and Low in New York.

The following table shows the high and low prices for prime lard oil in the New York market for each month since January, 1914, and also the high and low prices touched in each year:—

	1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.
January	93	93	92	92	94	92
February	93	92	92	92	95	94
March	94	92	92	90	96	95
April	94	94	90	88	98	96
May	94	92	88	86	1.06	1.00
June	92	92	90	88	1.08	1.04
July	92	92	88	86	1.10	1.05
August	92	92	86	84	1.10	1.05
September	92	90	86	84	1.10	1.08
October	90	90	90	88	1.25	1.10
November	90	90	92	90	*1.30	1.25
December	90	90	92	92	*1.30	1.30
Year	94	90	92	94	1.30	92

* Nominal.

MENHADEN OIL.

Production of menhaden oil in 1916 is estimated at 77,100 barrels, which compares with 55,000 barrels in 1915 and 71,000 barrels in 1914. The past season, while better than that of 1915 by more than 22,000 barrels, proved a failure for Northern operators. Considering the capital invested in the industry and the equipment employed, the results of the past three years have been a keen disappointment to the trade. In 1912 the total production of menhaden oil amounted to approximately 146,000 barrels, and in 1913 to 96,600 barrels, the output in 19[illegible] exceeding that of 1916 by almost 100 per cent.

Production of crude menhaden oil in the plants operating along the Atlantic coast and the Gulf of Mexico for 1916, and for the preceding seven

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years, is given in the following tabulation:—

Production for Eight Years.

	Barrels.
1916	77,100
1915	55,000
1914	71,000
1913	96,600
1912	146,000
1911	78,500
1910	77,000
1909	66,000

The following table shows the estimated production of crude menhaden oil in 1916 and 1915 by districts:—

	1916. Barrels.	1915. Barrels.
Northern factories	10,600	10,200
Chesapeake Bay	57,800	39,000
North Carolina	6,700	3,800
Texas and Florida	2,000	2,000

The season was unusually late in getting under way owing to the cold spring. During the summer months the fishing was so poor that operators in the Northern district, with but few exceptions, soon closed down their factories. The fishing in the South also was poor throughout the summer, but conditions improved in the fall, and during October and November some good catches were reported by the Chesapeake Bay fishermen, which brought up the total production in this district to some 57,800 barrels of crude oil, as against 39,000 barrels in 1915. Results in the North were no better than in 1915, total production amounting to 10,600 barrels, the bulk of which was made by the Delaware factories. Long Island producers were hard hit by the 1916 season, several important plants virtually remaining closed over the entire period.

Prices for the Season.

Prices for crude menhaden oil, however, were the highest on record, owing to the very unusual conditions which obtained in all of the oil markets. Record high prices were the rule for nearly all competing oils, assuring a good outlet for menhaden oil. Prices for crude menhaden oil ranged from 47c. to 70c. per gallon, with most of the business passing after the market jumped to 60c. per gallon. These high prices made the season of 1916 a profitable one for those who produced oil. Many of the Chesapeake Bay plants were able to resume dividends. During the year one plant was destroyed by fire.

The market for pressed menhaden oil followed that for crude closely throughout the year. Light strained menhaden oil opened the year at 52@54c. per gallon, then advanced to 60@62c. in May, but eased off slightly during the summer, selling around 56@58c. in July and August. In the fall, when the market for crude menhaden oil advanced sharply, refiners marked up their prices for light strained to 65@67c., and by November 70@72c. were nominal quotations. The year closed with offerings meager and prices nominal at 74@76c. per gallon.

High and Low, Crude Southern.

The high and low prices of crude Southern menhaden oil, in barrels, f. o. b. factory, for 1914, 1915 and 1916, by months, follow:—

	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
January	34	33	35	35	46	46
February	32½	32½	35	35	47	46
March	32	32	35	33	*47	47
April	32	32	*35	33	*48	47
May	*32	32	*35	35	*48	48
June	*33½	33½	35	33	48½	48
July	33½	32½	33	33	48	48
August	34	32½	33	33	49½	47½
September	34	33	38	33	48½	47
October	34	33	42	38	60	50
November	33	32	47	43	65	60
December	35	33	47	46	*70	65

* Nominal.

High and Low, Crude Northern.

The high and low prices of crude Northern menhaden oil, in barrels, f. o. b. factory, by months for 1914, 1915 and 1916, follow:

	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
January	38	37	*37	37	†	..
February	38	38	*37	37	†	..
March	37	37	*37	37	†	..
April	*37	37	*37	37	†	..
May	*38	37	37	37	†	..
June	*38	37	37	35	53	50
July	37	37	35	35	50	50
August	37	35	35	35	*51½	51
September	36	35	39	35½	†	..
October	*36	35	†	..	†	..
November	*37	37	†	..	†	..
December	*37	37	†	..	†	..

* Nominal. † None offering.

High and Low, Light Pressed.

The following table shows the highest and lowest prices of light strained menhaden oil in the New York market each month since January, 1913, and also the highest and lowest prices touched each year, the figures being based on the closing quotation each successive week:—

	1913. H.	1913. L.	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
January	33	32	40	39	38	38	54	52
February	33	32	39	39	40	38	56	54
March	34	32	39	39	40	40	56	56
April	34	32	39	38	42	40	58	56
May	33	32	38	38	40	40	61	60
June	32	30	38	38	38	38	60	58
July	32	31	38	36	40	38	58	57
August	34	31	38	37	40	38	57	57
September	37	35	37	37	42	40	58	57
October	38	37	37	37	44	42	66	58
November	39	39	37	37	49	45	72	68
December	39	39	38	38	50	49	70	74
Year	30	30	40	36	50	38	70	52

RED OIL.

Due to the high cost of raw materials, prices for red oil scored a sharp advance in 1916. The demand was fairly active, considering the high position of the market. There was a steady inquiry for the elaine oil, which was purchased in greater quantities than usual, owing to the very high market for other animal oils. Prices fluctuated in sympathy with tallow. The year opened with saponified red oil quoted at 6¼@6¾c. per pound. A flurry in the market for tallow, which set in during April, caused sellers to advance their views to 9¼@9¾c. per pound. Trading was routine during the summer period and the market eased off, saponified selling down to 8c. in September. In the fall tallow again moved upward, touching 11¾c., loose, and during November and December sellers were asking from 9c. to 9½c. for saponified red oil, the high for the year.

High and Low, New York.

Following are the high and low prices (per pound) for saponified red oil, by months, during 1914, 1915 and 1916:—

	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
January	6¾	6½	6¾	6¾	6¾	6¼
February	6¾	6¾	6¾	6¾	7½	7
March	6¾	6¾	6¾	6½	8¾	8
April	6¾	6¾	6½	6¾	9¼	8½
May	6¾	6¾	6¾	6	9¾	9½
June	6¾	6¾	6	5¾	9½	9
July	6¾	6¾	5¾	5¾	9	8½
August	7	6¾	5¾	5½	8½	8¼
September	7¼	7	5½	5½	8½	8
October	7¼	7	6½	5½	9	8¾
November	7	6¾	6½	6	9¾	9
December	7	6¾	6	5¾	9½	9

STEARIC ACID.

The market for stearic acid was strong throughout the year and prices held at the high levels established late in 1915. With imports cut off on account of the war, domestic producers again had things very much their own way. A bullish factor in the market was the upward tendency of raw materials; prices for tallow and other fats were the highest on record, naturally affecting the market for stearic acid. There was a good demand for stearic acid, both from foreign and domestic consumers. The demand was chiefly for the higher grades, the triple pressed selling up to 16c. per pound, f. o. b. New York. Double pressed stearic acid opened the year at 14@14½c. per pound. In February the market jumped to 14½@14¾c. per pound, but the demand fell away somewhat and, with raw stocks offered more freely, prices eased off, touching 13¾c. by May and 11½c. by August, the dull period. An upward movement in tallow stiffened prices over the fall months and the market advanced sharply, closing the year at 14¾@15c. per pound, the highest point for the entire period.

High and Low, New York.

Following are the high and low prices, per pound, of No. 1, or double pressed, stearic acid, by months during 1914, 1915 and 1916:—

	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
January	9¾	9½	9¾	9¾	14½	14
February	9½	9½	10½	10	14¾	14½
March	9½	9¼	11	10½	14½	14
April	9¼	9¼	12	11	14	14
May	9½	9¼	12	11¾	14	13¾
June	9¼	9¼	12	12	13½	13½
July	9¼	9¼	12	12	13½	12½
August	9½	9¼	12½	12	12	11½
September	10	9½	12½	12½	12¼	11½
October	9¾	9¾	13½	12½	13¾	13
November	9¾	9½	14	13½	14½	14¼
December	9½	9½	14	14	15	14¾

SEAL OIL.

Total production of seal oil in the Newfoundland district during the past year amounted to about 15,000 barrels, the quantity being even less than in 1915. There was a good demand for the oil and early in the season soapmakers contracted for almost the entire quantity on the basis of 63½c. per gallon, f. o. b. New York. With the production sold up so early in the season, offerings here were scanty and in the local market prices were merely nominal.

SPERM OIL.

Production of sperm oil was light and offerings were moderate throughout the year. Prices for crude sperm oil in the New York market were wholly nominal. Refined sperm oil met with a better demand, due to the sharp advance in competing oils, principally lard oil. The lowest prices obtained in January and the highest in December, the range being from 72@98c. per gallon for natural winter, 45-degree cold test. In January, 1916, prices for the natural winter oil ranged from 72@74c. per gallon, with the demand slow. Prices soon commenced to move upward, and by April sellers here were asking from 76@78c. per gallon. In the fall months, when free offerings of crude failed to appear on the market, and with competing oils marked up to the highest point on record, sellers jumped prices for sperm oil sharply, 84c. being paid in November. In December offerings of natural winter were scanty, and toward the close as high as 98c. was asked on the spot.

High and Low, New York.

The following tabulation shows the high and low price for refined sperm oil (natural winter 45-degree cold test) for each month in 1915 and 1916:—

	1915. H.	1915. L.	1916. H.	1916. L.
January	65	65	72	72
February	65	65	74	74
March	65	65	74	74
April	65	65	76	74
May	65	65	78	76
June	65	65	78	78
July	65	65	78	78
August	65	65	78	78
September	65	65	78	78
October	65	65	78	78
November	67	65	84	78
December	67	67	98	88
Year	67	65	98	72

TALLOW OIL.

Influenced by the high cost of pressing, stock prices moved upward, closing the year at the highest point in recent years. The scarcity of raw material was so acute at times that prices for tallow oil were more or less nominal. Business was fairly active, with a good export demand in evidence. In January acidless tallow oil was quoted in the New York market at 76@78c. per gallon, the inside figure representing the lowest point for the year. Prices advanced steadily, touching 92c. per gallon in July and 95c. per gallon by October 1. As prices for raw materials were highest in November and December, dealers of tallow oil advanced their views to $1.04@1.06 per gallon.

High and Low, New York.

The following table shows the high and low price of acidless tallow oil for each month in 1915 and 1916:—

	1915. H.	1915. L.	1916. H.	1916. L.
January	62	62	82	76
February	62	62	83	82
March	62	61	84	84
April	62	61	86	84
May	62	61	90	86
June	61	61	90	90
July	62	62	92	88
August	63	62	86	82
September	64	64	90	84
October	70	64	95	90
November	72	70	1.06	95
December	74	72	1.04	1.04
Year	74	61	1.06	76

WHALE OIL.

Production of whale oil in 1916 was sub-normal, and with no supplies forthcoming from foreign sources, owing to the conditions resulting from the war, the market here was strong and prices were nominal throughout the year. Canada placed an embargo on exports of whale oil, and the output of the Swedish interests was absorbed abroad. Some lots of No. 1 crude whale oil sold on the Pacific coast at prices ranging from 55c. to 60c. per gallon, in tanks. Late in the season 55c. per gallon was paid for a quantity of the No. 3. There was a good demand for crude whale oil, but the shortage in the supply restricted business. Refined whale oil was high in price, following the tendency of the market for crude and the very strong position of competing oils. The year opened with natural winter refined whale oil quoted at 54@56c. per galdon. During the summer period sellers were asking from 62c. to 64c. per gallon, despite the general lull in business. In the fall, as the shortage in the supply became more apparent, prices were advanced sharply, and by the close of the year leading factories were asking 78c. per gallon for the natural winter, with offerings moderate.

High and Low, New York.

The following tabulation gives the high and low price of refined (natural winter pressed) whale oil by months during 1915 and 1916:—

	1915. H.	1915. L.	1916. H.	1916. L.
January	48	48	56	54
February	48	48	58	58
March	48	48	60	58
April	48	46	60	58
May	46	46	60	60
June	48	48	62	60
July	48	48	63	63
August	50	48	62	62
September	50	50	64	62
October	50	50	68	64
November	52	50	74	70
December	52	52	78	76
Year	52	46	78	54

Average Prices of Fish Oils Exported from Canada.

The average price per gallon of various fish oils exported from Canada during the years 1890 to 1915, inclusive, are given in the following table:—

Year.	Cod.	Seal.	Whale.	Others.
1890	.356	.316	.362	.171
1891	.295	...	.34	.246
1892	.312	.323	.319	.248
1893	.297	.434	.438	.25
1894	.243	.356	.162	.389
1895	.230	.296	.234	.348
1896	.245	.378	...	.313
1897	.245	.251	.243	.329
1898	.246	.204	.303	.266
1899	.244	...	.245	.601
1900	.254	.276	...	1.00
1901	.261	.313	.421	.924
1902	.289	.316	...	.352
1903	.29	.316	...	.464
1904	.528	.351	...	.360
1905	.487	...	.278	.284
1906	.309	.291	.30	.28
1907	.287	.352	.336	.184
1908	.289	.383	.351	.284
1909	.311	.30	.374	.445
1910	.248	.355	.290	.206
1911	.335	.338	.277	.352
1912	.427	.471	.408	.492
1913	.344	.361	.329	.351
1914	.302	.314	.444	.314
1915	.316	.250	.432	.257

EFFECTS OF EUROPEAN WAR REFLECTED IN CHICAGO LARD MARKET YEAR PRICES

The great outstanding feature of the Chicago lard market during the year 1916 was, of course, the condition due to the effects of the European war. This mighty conflict has brought about a great and ever increasing demand in the United States for lard, along with practically all other food products, and necessarily forced lard prices up to their highest level since the Civil War. The great advance in grain and other foodstuffs, too, has been felt in this market.

The product moved very freely during most of the year, despite the fact that the Central Empires, usually large consumers, have been shut off from trade with the United States by the blockade of the Allied powers. The free movement of lard was due chiefly to the fact that the Entente powers have taken much larger lots of lard and of all other food products than they did in peace times, because their own power of production has been naturally decreased by reason of the taking of so many men from the farms and putting them into the armies. The neutral countries of Europe also largely increased their imports of lard and other foodstuffs during the year for the same reason, because, while not at war, they have had to keep large standing armies mobilized. In addition the Belgian Relief Commission has been a large and important factor in the market, especially in the last few months, as it has bought huge quantities of lard, along with other foodstuffs, at high prices.

Market Strongest Since Civil War.

All these factors have played a part in bringing about the strongest and most active market since Civil War times, and in addition there has been a large increase in domestic demand, due partly to the natural growth in population of the country and the consequent increase in its consuming power and very largely to the vast improvement in the industrial affairs of the nation and in the general prosperity of the country.

As a result of these conditions Chicago's position as the chief lard market, not only of the United States but of the entire world, was easily maintained during 1916. In production, marketing and speculative trade the Chicago lard market surpassed all others.

May Lard Prices—Six Years.

The range of May lard prices at Chicago during the year 1916, as well as for a series of years, follows:—

Month.	1915-16.	1914-15.	1913-14.
June	....	....	....
July	....	....	....
August	....	....	10.75
September	9.10	....	10.92½
October	9.02½	10.00	10.95
November	9.90	10.22½	11.45
December	8.87½	9.82½	10.40
January	9.92½	10.77½	11.17½
February	9.57½	9.75	11.27½
March	10.30	10.75	10.87½
April	10.07½	10.62½	11.20
May	11.25	11.35	10.95
June	10.00	10.15	11.40
July	10.85	11.60	10.55
August	10.42½	10.00	11.60
September	11.60	10.82½	10.45
October	11.20	9.95	10.90
November	12.75	10.35	9.77½
December	12.45	9.47½	10.62½
January	13.15	10.32½	9.62½
February	8.87½	9.47½	10.10
March	13.75	11.60	9.62½
Entire range	8.87½	9.47½	9.62½
Month.	1912-13.	1911-12.	1910-11.
June	....	....	....
July	....	....	....
August	....	8.80	....
September	....	9.12½	....
October	10.02½	8.72½	10.02½
November	10.62½	9.50	10.00
December	10.12½	8.82½	9.62½
January	10.75	9.32½	10.35
February	10.10	9.10	9.40
March	10.37½	9.67½	9.97½
April	9.70	9.10	9.62½
May	10.27½	9.52½	10.45
June	9.70	9.30	9.70
July	10.40	9.67½	10.40
August	10.15	8.92½	9.07½
September	10.85	9.45	9.90
October	10.47½	9.20	8.25
November	11.22½	9.95	9.30
December	10.65	9.70	7.75
January	11.25	11.20	8.32½
February	10.80	10.37½	7.85
March	11.30	10.92½	8.22½
April	9.70	8.72½	7.75
May	11.30	11.20	10.60
Entire range	11.30	11.20	10.60

Range of Prices for 1916.

The range of cash lard prices for the twelve months of the year was as follows:—

Month.	Low.	High.	Close.
January	9.87½	10.92½	10.00
February	9.72½	10.30	10.30
March	10.30	11.42½	11.00
April	11.20	12.77½	12.77½
May	12.50	13.15	12.60
June	12.22½	13.20	13.20
July	12.57½	13.32½	12.57½
August	12.55	14.25	14.12½
September	14.15	14.77	14.15
October	14.47½	17.00	17.00
November	16.50	17.45	16.90
December	15.15	16.85	15.35
Range, 1916	9.72½	17.45	....

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Receipts and shipments of lard (in pounds), by months, for the year of 1916 were as follows:—

1916	Receipts.	Shipments.
January	13,499,000	32,230,000
February	13,737,000	36,057,000
March	9,577,000	29,119,000
April	8,738,000	29,887,000
May	13,329,000	35,804,000
June	10,193,000	35,293,000
July	10,272,000	25,112,000
August	7,653,000	27,495,000
September	4,032,000	32,868,000
October	5,779,000	21,945,000
November	7,837,000	25,643,000
December	17,239,000	32,569,000
Totals	120,915,000	366,813,000

Receipts and Shipments, 1915.

A comparison of the foregoing figures with those of the preceding year is interesting. Receipts and shipments for 1915 (in pounds) were as follows:—

Receipts and Shipments, 1916.

1915.	Receipts.	Shipments.
January	10,047,000	28,216,000
February	9,707,000	34,207,000
March	10,715,000	34,359,000
April	12,671,000	19,986,000
May	12,661,000	17,332,000
June	15,017,000	19,240,000
July	8,910,000	15,040,000
August	6,525,000	21,582,000
September	4,425,000	26,863,000
October	4,417,000	35,717,000
November	4,598,000	39,840,000
December	7,089,000	33,259,000
Totals	106,780,000	325,641,000

High and Low for Forty Years.

The highest and lowest prices at which cash lard sold during the past forty-one years, as well as the months in which the extreme points were reached, follow:—

Years.	Months the lowest prices were reached.	Range for the entire year.	Months the highest prices were reached.
1876.	September	$9.55 @13.85	March & Apr.
1877.	December	7.55 @11.65	January
1878.	December	5.32½@ 7.80	August
1879.	August	5.30 @ 7.75	December
1880.	June	6.35 @ 7.85	November
1881.	February	9.20 @13.00	July
1882.	March	10.05 @13.10	October
1883.	October	7.15 @12.35	May
1884.	December	6.45 @10.00	February
1885.	October	5.82½@ 7.10	Feb. & April
1886.	May	5.82½@ 7.50	September
1887.	June & Oct.	6.20 @ 7.92½	December
1888.	January	7.25 @11.20	October
1889.	December	6.75 @ 7.55	January
1890.	December	6.50 @ 6.52½	April
1891.	February	5.47½@ 7.05	September
1892.	January	6.05 @10.60	December
1893.	August	6.00 @13.20	March
1894.	March	6.45 @ 9.05	September
1895.	December	5.15 @ 7.17½	March
1896.	July	3.05 @ 5.85	January
1897.	June	3.42½@ 4.90	September
1898.	Jan. & Oct.	4.62½@ 6.82½	May
1899.	May&June	4.90 @ 5.77½	January
1900.	February	6.85 @ 9.40	October
1901.	January	6.90 @10.25	September
1902.	February	9.07½@11.60	September
1903.	October	6.20 @11.00	September
1904.	May	6.15 @ 7.92½	Feburary
1905.	January	6.55 @ 9.85	August
1906.	January	7.32½@ 9.85	October
1907.	November	7.50 @ 9.97½	November
1908.	February	6.97½@10.45	March
1909.	January	9.40 @13.90	November
1910.	November	9.70 @14.65	February
1911.	April	9.70 @11.67½	January
1912.	February	8.65 @11.97½	October
1913.	January	9.47½@11.87½	July
1914.	August	8.60 @11.60	November
1915.	July	7.55 @11.27½	February
1916.	February	9.72½@17.45	November

Stocks of Contract Lard.

Stocks of "contract" lard held in Chicago during each month of the year 1915,, together with comparisons for the previous six years, follow:—

	1916. *Tcs.	1915. Tcs.	1914. Tcs.	1913. Tcs.	1912. Tcs.	1911. Tcs.
Jan.	43,900	19,741	38,738	17,325	49,857	17,793
Feb	139,700	18,530	73,231	18,981	82,795	9,232
Mar	184,350	70,543	97,107	15,184	104,959	15,274
Apr	212,500	96,001	105,706	12,534	107,189	33,776
May	202,250	125,580	123,799	13,304	118,059	44,949
Jun	177,200	195,431	143,059	33,905	120,437	59,780
July	167,800	248,871	169,216	84,781	166,475	113,813
Aug	182,900	274,960	200,574	120,424	194,063	148,444
Sep	144,200	266,913	179,764	125,134	165,857	117,747
Oct	111,240	246,932	120,921	110,137	91,156	70,730
Nov	87,100	169,751	17,205	64,780	42,702	48,325
Dec	62,300	134,878	11,379	48,523	17,541	46,015

*Tierces, 350 pounds.

The lard market now faces a strange situation, in that, while the war has benefited the market—has been a bull factor—still the peace that is hoped for so widely is also considered a bull argument, because it is confidently expected that as soon as the war is ended the Central Powers will have to come into the market for enormous quantities of foodstuffs, including lard, as they are known to be pretty well stripped of live stock. The other powers will also have to continue buying here in large quantities until they can renew their flocks and herds and restore their farms to their normal basis of productivity.

The close of the year finds Chicago with lard stocks, roughly speaking, that can be called neither large nor small, while all indications point to a continuance of the big trade, with high prices, during the year 1917.

Chicago Tallow Market Very Active in 1916.

The tallow market in Chicago was very active during the year 1916, except in the latter part of July and the first part of August, when there was a marked dullness. Demand was greater than the supply, in spite of the fact that exports of the commodity were only about half what they were in 1915, indicating a very great increase in domestic consumption.

The increased demand at home for tallow and grease was largely attributed to effects of the European war. The great general industrial and transportation expansion have caused a tremendous increase in the demand for tallow and lard oil for mechanical uses. There also was a large increase in the demand for stearic acid, produced from tallow and grease, and used in the domestic manufacture of candles. France and other European countries, as well as the South American countries, were heavy buyers of stearic acid here. The increased demand for glycerine for war purposes also tended to shorten the supply of tallow and grease.

All these factors made for a strong market and prices averaged around 30 per cent. higher for the year than in 1915. Edible government tallow on December 28, 1915, sold at 9c., and at the close of 1916 the price was 12½c. Prime packers' tallow sold on December 28, 1915, at 8½c., and at the close of 1916 the price was 11½c.

Receipts and Shipments, 1916.

Receipts and shipments (in pounds) of tallow, by months, for the year 1916 were as follows:—

	Receipts.	Shipments.
January	3,048,000	4,489,000
February	4,426,000	4,015,000
March	3,647,000	4,219,000
April	4,497,000	3,484,000
May	4,680,000	3,242,000
June	5,096,000	4,035,000
July	2,754,000	4,133,000
August	4,272,000	4,387,000
September	2,927,000	3,714,000
October	3,419,000	3,506,000
November	3,773,000	4,919,000
December	2,460,000	4,298,000
Totals	43,608,000	48,441,000

Receipts for 1915 were 27,252,000 pounds.
Shipments for 1915 were 39,133,000 pounds.

Chicago Stearine Market.

Stearines in the local market have had a year of activity, with gradually mounting prices, following the course of tallow and greases, but exceeding them in price gains. The increase in prices during the year 1916 amounted to about 40 per cent. and in some instances—notably prime oleo stearine—new high record marks were reached. While prices slumped a little just before the holiday season, owing to seasonal dullness chiefly, and partly in sympathy with other products, the market was strong almost all the year and the undertone now is strong. W. Europe stripped of live stock and animal food products, the outlook is considered especially promising for lard and all edible fats, as enormous quantities of these products are sure to be imported by all the war-ravaged countries as soon as peace is declared. Therefore the peace talk is considered as a bull argument. On the other hand, if the war goes on another year the allied powers and neutral nations are certain to increase their already large imports of these products. In the first part of December, 1916, prime oleo stearine rose to 15c., while lard stearine went up to 17@17¼c. These prices were considerably above the highest 1915 figures. Extra oleo oil at the same time was sold at 20@21c., No. 1 oleo oil at 18¾c. and No. 3 oleo oil at 17@18c., while extra oleo stock rose to 18¾@19¾c. and No. 1 oleo stock to 18¼@18½c. At the close of December, 1916, prime oleo stearine sold at 13¾c., as compared with 9¾c. on December 27, 1915.

Receipts and Shipments, 1916.

Receipts and shipments (in pounds) of stearine by months:—

	Receipts.	Shipments.
January	624,000	2,991,000
February	458,000	3,425,000
March	260,000	3,622,000
April	485,000	1,934,000
May	613,000	1,276,000
June	147,000	982,000
July	.....	1,526,000
August	46,000	2,221,000
September	268,000	2,223,000
October	229,000	1,554,000
November	372,000	2,752,000
December	118,000	1,668,000
Totals	3,647,000	26,174,000

Receipts for 1915 were 8,852,000 pounds.
Shipments for 1915 were 23,018,000 pounds.

Chicago Grease Market.

Greases in the Chicago market followed to a large extent the course of tallow during the year 1916. The market was much more active than in 1915, demand was better and prices were about 30 per cent. higher. As in the tallow market, the domestic demand was very largely increased. Ordinary yellow grease sold on December 28, 1915, at 7¼c., while at the close of 1916 it sold at 9¾c. B white grease sold December 28, 1915, at 7½c. and at the close of 1916 at 10¼c.

London Tallow Market Prices Highest in February and December.

An indication of the course of prices for tallow in London is presented in the following table showing spot value at the end of the first week in each month for the better qualities of mutton and beef descriptions:—

	Fair to fine mutton. s.	d.	s.	d.	Fair to fine beef. s.	d.	s.	d.
January	50	@	54	3	49	@	51	6
February	54	@	56	6	52	@	53	6
March	50	@	54	0	49	@	52	0
April	51	@	54	0	48	@	52	0
May	50	@	54	0	48	@	52	6
June	46	@	48	6	46	@	48	0
July	46	@	48	6	47	@	48	0
August	48	@	51	0	48	@	49	6
September	47	@	49	0	47	@	49	0
October	42	@	44	0	42	@	46	0
November	43	@	50	0	45	@	50	0
December	54	@	58	0	52	@	56	6
Close of year	54	@	58	0	52	@	56	6

Garbage Grease.

The movement of this grease was very active during the past year and demand exceeded supply. Dealers who handle the output for New York, Chicago, Cleveland and other large cities disposed of their contracts early in the season and the relatively high prices for oils and fats stimulated the demand for contract deliveries of garbage grease. During the last six months of the year there was a pronounced scarcity of this material available on spot and the market remained in a nominal position. Prices during the year ranged from 3½c. to 8c. a pound, the inside price being available at the beginning of the year and the maximum figure representing the nominal closing price.

N. Y. PAINT MARKET PRICES REFLECTED FREIGHTS AND PRODUCTION CONDITIONS

Short Metal Supply Affected Lead and Zinc Pigments Progress Reported in Development of Dry Color Industry—Freights Governed Imports.

Beginning with the outbreak of hostilities in Europe, prices for many paint materials became unsettled. Readjustments to changed conditions followed slowly, and prices in 1916 still showed the unsettled condition of the market. The higher cost for raw materials was the outstanding feature of the year. True it is that paint manufacturers advanced prices for prepared paints, but the increases were not commensurate with the higher producing costs, and in consequence the position of manufacturers was far from satisfactory. In the issue of November 13 the Reporter dicussed editorially the position of raw materials and the effect on the finished product. The following comparisons were offered:

Raw Materials and Finished Products.

Within the past eighteen months all containers for ready-mixed paints, tin cans, packing boxes, labels and advertising matter have increased in cost from 10 to 20 per cent., while labor cost has increased from 30 to 50 per cent. since the first war year. In the marketing of such a material as ready-mixed paint these costs play a most important part.

A pure lead and zinc paint, with equal portions by weight of dry basic lead carbonate and American XX zinc, will not weigh less than 14½ pounds a gallon. Should the dry lead be of the Dutch process make of heavy gravity or density, the paint will weigh from 14¾ to 15 pounds a gallon. Taking the average run of dry lead as a basis, we find the bulk cost of pure lead and zinc paint, with pure linseed oil and drier, figuring on equal weight of basic carbonate of lead and American zinc, to have been as follows in December, 1914 and 1915, and today:—(The figures are based on a paint weighing 14½ pounds net per U. S. gallon of 231 cubic inches.)

December, 1914—	
Zinc oxide, 4¾ lbs. at 5¼c. per lb...	$0.249375
Dry white lead, 4¾ lbs. at 5c. per lb.	0.2375
Linseed oil, 4¾ lbs. at 6c. per lb...	0.285
Japan drier, ¼ lb. at 8c. per lb.....	0.02
Total cost per gallon (1914).....	$0.791875
December, 1915—	
Zinc oxide, 4¾ lbs. at 8¾c. per lb...	$0.4046875
Dry white lead, 4¾ lbs. at 6¼c. per lb.	0.296875
Linseed oil, 4¾ lbs. at 8c. per lb....	0.38
Japan drier, ¼ lb. at 9c. per lb.....	0.0225
Total cost per gallon (1915).....	$1.1040625
November 11, 1916—	
Zinc oxide, 4¾ lbs. at 9¾c. per lb..	$0.4667925
Dry white lead, 4¾ lbs. at 8¾c. per lb.	0.415625
Linseed oil, 4¾ lbs. at 12c. per lb....	0.57
Japan drier, ¼ lb. at 10c. per lb....	0.025
Total cost per gallon (1916).....	$1.4774175

This would show an increase in the cost of each gallon of mixed paint by years as follows:—

Increase 1915 over 1914—$0.3121875
Increase 1916 over 1915—$0.3733550

It is at once noted that the increase in the basic cost of a gallon of mixed paints in the interim since the beginning of the European war aggregates more than 68½ cents.

Imported Materials.

Imported materials entering into the composition of paints not only were affected by conditions existing in primary markets, but also by the difficulty in making shipments to consuming markets. Scarcity of tonnage and unusually high ocean freights were important factors in the case of every imported material. On the other hand, export inquiry for many domestic materials was increased, and this also was a bullish factor on prices. Demand for paint materials for domestic consumption was not active in the early part of the year, but improved later on, and the fall season was highly satisfactory from the standpoint of trading.

The dry color industry shows considerable progress during the year. Of course prices were far from the normal levels, at least in most cases, but considerable headway was made in producing colors which formerly came from abroad. Important chemicals used in the color industry remained high in price, but became more settled as the year wore on, and this condition was reflected in the finished products.

Effect of Shipping Situation.

Among the miscellaneous articles are many of foreign origin, and the shipping situation was prominent in cutting down supplies, and in adding to the cost. For instance, it was difficult to negotiate chalk shipments in quantities large enough to satisfy consuming needs. This not only created a nominal market for chalk, but also had a direct bearing on such materials as whiting and putty. Casein also may be included among the items which were in limited supply. Smaller imports of glues had a beneficial effect on the home industry, and in the latter part of the year manufacturers were well sold up on contracts, and prices had reached the highest levels in years.

Five-Year Census Figures.

The census figures for 1914 on the paint and varnish industry were issued during the year, and show interesting comparisons with the preceding census which covered the year 1909. Reports were received from 855 establishments engaged in the industry in 1914, the total products of which for the year were valued at $149,049,820. Of these 855 establishments, the principal business of 799 was the manufacture of paints or varnishes, and 56 were engaged primarily in other industries, but produced paints or varnishes to the value of $3,507,182 as subsidiary products. In 618 establishments, with a total paint and varnish output valued at $113,953,084, a greater value of paints than of varnishes was produced; and in the remaining 237 establishments, with a total output of $35,096,736, the value of varnishes produced was greater than that of paints.

The products in 1914 comprised colors or pigments valued at $17,407,955; oil paints, $70,582,461; water paints and kalsomine, $2,202,281; varnishes and japans, $36,061,203; fillers, including putty, $3,239,174; bleached shellac, $1,806,802, and other products to the value of $17,749,944.

At the census of 1909 there were reported 863 establishments, with products valued at $127,472,819. Of these 863 establishments, the principal business of 791 was the manufacture of paints or varnishes and 72 were engaged primarily in other industries but produced paints or varnishes to the value of $2,583,397 as subsidiary products. In 644 establishments, with a total paint and varnish output valued at $96,476,286, a greater value of paints than of varnishes was produced; and in the remaining 219 establishments, with a total output of $30,996,535, the value of varnishes produced was greater than that of paints.

The value of the 1914 output of all establishments thus exceeded that of 1909 by $51,577,001, or 16.9 per cent., the establishments representing the paint industry showing an increase of $17,476,798, or 18.1 per cent., and those in the varnish industry, $41,100,208, or 13.2 per cent.

Pig Lead.

According to official reports, the lead industry in 1916 made good gains in output, both in mining and smelting. The lead content of ore mined in the United States in 1916 was about 622,000 short tons, compared with 561,639 tons in 1915, an increase of 60,000 tons, or over 10 per cent. The average price of lead in 1916 was so much higher than in 1915 that the increase in value of the mine output of lead was about 50 per cent.

The production of refined lead, desilverized and soft, from domestic and foreign ores in 1916 was 579,600 tons, worth at the average New York price $78,826,000,. compared with 550,055 tons, worth $51,705,000, in 1915, and with 542,122 tons, worth $42,286,000, in 1914. The figures for 1916 do not include an estimated output of 21,800 tons of antimonial lead, worth approximately $4,283,000, compared with 23,224 tons in 1915 and with 16,667 tons in 1914. Of the total production, desilverized lead of domestic origin, exclusive of desilverized soft lead, is estimated at 324,000 tons, against 301,564 tons in 1915 and 311,069 tons in 1914; and desilverized lead of foreign origin at 21,400 tons, compared with 43,029 tons in 1915 and 29,328 tons in 1914. The production of soft lead, mainly from Mississippi Valley ores, is estimated at 234,200 tons, compared with 205,462 tons in 1915 and 201,725 tons in 1914. The total production of desilverized and soft lead from domestic ores was thus about 558,200 tons, valued at $75,915,000, compared with 507,026 tons, valued at $47,660,000, in 1915, a gain of 51,000 tons. Of this gain in domestic production, about 29,000 tons was made in soft lead and 22,000 tons in domestic desilverized lead.

In consequence of the great demand for lead a considerable quantity of secondary lead (about 7,000 tons) and secondary antimonial lead (over 5,000 tons) was recovered at the regular smelters.

Lead began the year at New York with a price of 5.5 cents a pound, the minimum price of the year, and rose to 8 cents early in April, this being the maximum figure. A long decline carried the price down to 5.95 cents a pound in the early part of August. Another rise reached 7 cents about the middle of September, after which the price remained stationary until early in December, when it advanced to 7.5 cents, and it closed the year at about that figure. The average New York price for the year was 6.8 cents, compared with 4.7 cents in 1915, 3.9 cents in 1914, and 4.4 cents in 1913.

Refined Lead Production Since 1900.

The following table shows the production of refined lead, in tons, in the

INDIGO

SYNTHETIC & NATURAL

BOSTON NEWS BUREAU. August 18, 1915.

THE DYESTUFF SHORTAGE.

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Boston—Since the war opened China has supplied this country with nearly 1,000,000 pounds of one of the most important dyestuffs, viz., synthetic indigo. The major portion of this, we understand, has been found and imported by the Leonard W. Cronkhite Co. of Boston.

THE GERMAN PROPAGANDA.

Boston—At request of President Wilson, the Providence Journal has presented to Secretary of the Navy Daniels and members of the neutrality board, at a special meeting in Washington, a series of acts alleged to prove ... of German propaganda in this country and activi... spy system for several years before beginning ... Principal charges are: That Dr. K. ... ive ... Bayville wireless station ... ugh ... ediat... to parts ... Brook... of ...

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United States from 1900 to 1916, inclusive:—

	Desilvered.	Soft lead.	Total production.
1900	329,658	48,021	377,679
1901	323,790	57,898	381,688
1902	303,011	74,050	377,061
1903	295,074	83,444	378,518
1904	315,284	89,169	404,453
1905	296,186	103,116	399,302
1906	313,886	90,860	404,746
1907	314,241	99,948	414,189
1908	295,420	101,013	396,433
1909	329,310	118,802	448,112
1910	329,062	141,318	470,380
1911	331,029	155,947	486,976
1912	311,414	169,551	480,965
1913	301,830	156,013	466,843
1914	337,552	199,527	537,079
1915	355,000	210,000	565,000
1916	345,400	234,200	579,600

White Lead.

An eventful year was recorded in the white lead trade. Never in the history of the trade was the market so unsettled as was the case during the spring months. At that time corroders were quoting only for prompt shipment and stocks were so limited and the prospects for securing supplies of the metal so uncertain that buyers of the pigment were unable to cover ahead. In the beginning of the year dry basic carbonate was quoted at 6¼c. per pound, but higher prices for pig lead, a scarcity of acetic acid quickly affected the market and the pigment was advanced one-quarter cent per pound. White lead in oil opened the year at 7¼c. per pound, but followed the lead of dry white lead and advanced one-quarter cent per pound the first week of January.

Changes in price followed in rapid succession up to the middle of March, when the dry product was quoted at 8¾c. per pound, and white lead in oil at 9¾c. per pound. These prices, too, were largely nominal, as offerings were small, and it was not until late in June that carroders would consider orders for anything but prompt shipment, and even then buyers could cover for but a period of sixty days in advance. As corroders and accepted contracts freely in the latter part of 1915, they were forced to deliver low priced material in the early part of 1916, and in some cases substantial losses were met by corroders, and even though sellers were covered on raw materials in no case could they replace stocks at the prices at which they had accepted contracts.

Basic Sulphate.

Basic sulphate white lead began the year at 6c. per pound, but by the middle of March it was selling at 8¼c. per pound, or on a parity with basic carbonate. There were no changes in quotations for basic carbonate either dry or in oil during the later part of the year, and 8¾c. per pound was the closing price for the dry product, and white lead in oil closed at 9¾c. per pound. Basic sulphate, however, was reduced to 8¼c. per pound in November, as producers had made favorable purchases of lead ore and passed the advantage along to consumers by offering basic sulphate at 8¼c. per pound on ninety-day contracts.

Demand for white lead generally considered was about normal, and the steadier position of the market in the latter part of the year was more favorable to trading and also to corroders. Export buying was better than normal and shipments abroad were said to be larger than ever before. Official figures giving export shipments through November showed a gain of about 14 per cent. over 1915, and more than 50 per cent. over 1914.

Basic Carbonate White Lead Prices.

The following table shows the price of dry basic carbonate white lead for each month last year, with comparisons for the former three years:—

	Cents per pound. 1915.
January	6¼@7
February	7 @7¼
March	7¼@8¾
April	8¾@—
May	8¾@—
June	8¾@—
July	8¾@—
August	8¾@—
September	8¾@—
October	8¾@—
November	8¾@—
December	8¾@—

	High.	Low.
1915	7¾	5
1914	5¼	5
1913	5¾	5¼

Red Lead.

Red lead was more susceptible to was the case with white lead. Conditions in the white lead market, however, were influential in the case of the oxide, and the history of prices and the reasons for fluctuations are largely identical. At the beginning of the year dry red lead was quoted at 7¼c. per pound and red lead in oil at 8c. per pound. There was a steady upward movement of prices in the first quarter of the year until in March the dry product was held at 9¾c. per pound and red lead in oil at 10¼s. per pound. These were the prices which prevailed over the latter part of the year. The inquiry from foreign markets, which became prominent in the latter part of 1915 was maintained in the first part of 1916 and producers were forced to refuse such business in order to conserve stocks for the home trade.

High and Low Prices Domestic Red Lead.

The subjoined table shows the high and low prices of domestic red lead for last year, with comparisons for the former year:—

	1915. H.	1915. L.	1916. H.	1916. L.
January	5½	5½	7¾	7¼
February	5½	5½	8¼	7¾
March	5½	5½	9¾	8¼
April	5¾	5¾	9¾	9¾
May	6	5¾	9¾	9¾
June	8¾	6½	9¾	9¾
July	7¾	7½	9¾	9¾
August	7½	6½	9¾	9¾
September	6½	6½	9¾	9¾
October	6½	6½	9¾	9¾
November	7¼	6½	9¾	9¾
December	7¼	7¼	9¾	9¾
1914			6½	5½
1913			7½	6
1912			7½	6½

Litharge.

Market values for litharge started to advance the first week of the year. The opening price was 6½c. per pound and at the close 9¼c. per pound was asked, thus showing a net increase of 2¾c. per pound for the year. The high level was reached in March, and as was the case with the other lead pigments, price upheavals came in the early part of the year with a steady market in the latter part. At times the market was practically bare of stocks and during the spring sellers were not quoting for future deliveries but were waiting for developments in the metal market before committing themselves on the pigment. An unusually good demand for export was reported in the early part of the year, and as foreign grades were less prominent in domestic markets, the question of supplying demands became paramount. Some of the trades which consume this material were calling for larger allotments than usual, and large shipments were made to the rubber and glass trades. While prices were strong in the latter part of the year and high levels were maintained, there was not the stringency in supplies which characterized the market earlier in the year.

High and Low Domestic Litharge.

The highest and lowest quotations for domestic litharge on the local market for the last year, with comparison, follow:—

	1915. H.	1915. L.	1916. H.	1916. L.
January	5	5	7¾	6½
February	5	5	7¾	7¼
March	5¼	5	9¼	7¾
April	5¼	5¼	9¼	9¼
May	5½	5¼	9¼	9¼
June	8¼	6	9¼	9¼
July	7	7	9¼	9¼
August	7	6	9¼	9¼
September	6	6	9¼	9¼
October	6	6	9¼	9¼
November	6½	6	9¼	9¼
December	6½	6½	9¼	9¼
1914			6	5
1913			7	6
1912			7	6½

Orange Mineral.

Production of orange pigment is much smaller than that of the other lead pigments, and on that account it is relatively less important from the standpoint of amount consumed. Ordinarily this pigment is not so sensitive to changes in the metal market as are the other lead pigments. A review of prices during 1916, however, reveals the fact that orange mineral advanced more than white lead, red lead and litharge. Opening the year, manufacturers quoted orange mineral at 9c. per pound. By March the price had gone up to 12@12¼c. per pound, and it did not go below that level during the remainder of the period. Scarcity of foreign grades put a greater tax on the domestic output, and the question of equalizing supply and demand was rendered more complicated by an increased call from foreign markets. There was a difference in the prices quoted by different producers, and this accounts for the range in quotations.

Two Year Prices Domestic Orange Mineral.

Prices for domestic orange mineral for each month of the yast year, with comparisons for the former year, were as follows:—

	1915.	1916.
January	7¼@8¼	9 @10
February	7¼@8¼	10 @10½
March	7¼@8¼	10½@12¼
April	7¼@8¼	12 @12¼
May	7¼@8¼	12 @12¼
June	7¼@9¼	12 @12¼
July	—@9¼	12 @12¼
August	8¼@9¼	12 @12¼
September	—@8¼	12 @12¼
October	—@8¼	12 @12¼
November	—@9	12 @12¼
December	—@9	12 @12¼

	High.	Low.
1914	8½	7¼
1913	10	7½
1912	10	8½

Spelter.

The production of spelter from domestic ore in 1916 is estimated at 553,000 short tons, worth, at the average St. Louis prices about $150,000,000, and from foreign ore at 105,000 tons, a total of 658,000 tons, worth $180,000,000, compared to a toal of 489,519 tons in 1915 (458,135 tons of domestic origin, and 31,384 tons of foreign origin), worth $121,400,000 at the average St. Louis price. This was a gain of 169,000 tons in quantity and an indicated gain of more than $58,600,000 in value. The actual gain in value, however, was considerably less because much of the spelter was sold for future delivery at prices from 1 to 2 cents below the quotations for immediate delivery. Included in the output is 11,878 tons of electrolytic spelter, of which a part was refined by electrolysis from prime western spelter. The output of zinc dust was about 2,500 tons, compared with 1,755 tons in 1915.

The output of secondary spelter redistilled at regular smelters and at the smelters with large retorts was about 32,000 tons. It is probable that the output of remelted spelter was not less than that of the preceding year, 23,000 tons, which would give a total of 55,000 tons of secondary spelter. Adding this to the production of primary spelter gives a grand total of 713,000 tons of spelter made in the United States in 1916.

The price of spelter at St. Louis at the beginning of 1916 was 17.2 cents a pound. By the middle of February it had risen to 20.9 cents a pound, the high point of the year, after which it dropped sharply to 16.5 cents by the middle of March, but rose quickly again to 19¼c. at the middle of April. Then began a long sharp decline which brought the price to 8.8c. a pound at the middle of July. A recovery to 10.7c. was followed by a drop to 8.4c. on August 10, the lowest price of the year. By fits and starts the price rose to 13.2c. a pound at the end of November, after which it gradually declined, closing the year at about 10c. a pound. The average price for the year for immediate delivery at St. Louis was 13.7c. a pound, compared with 14.2 cents a pound in 1915 and 5.1c. in 1914.

Zinc Oxide.

Domestic manufacturers of zinc oxide continued in their policy of distributing their output on contract orders. In the case of French process zinc oxide contracts covered periods of three months. In this case of American process zinc oxide contract were accepted covering deliveries over six months. These contracts practically accounted for the entire production and trading in the spot market was largely limited to second hands. Contract prices for American process zinc oxide for the first six months of the year were established on a basis of 8⅝@8¾c. per pound. On May 1 contract prices for the second half of the year were announced. These prices were on a basis of 9¾@9⅞c. per pound. In November prices were fixed for the first half of 1917, and they were at the same levels as had prevailed in the last half of 1916.

French Process Prices.

Quotations on French process zinc oxide for the first quarter of the year were as follows: 16c.@16½c. per pound for red seal, 16½c.@16⅝c. per pound for green seal and 17@17½c. per pound for white seal. Early in March producers made public the prices for the second quarter of the year. The new quotations were on a basis of 24@24¼c. per pound for red seal, 24½@24⅝c. per pound for green seal and 25@25½c. per pound for white seal.

It will be noted that these quotations show an advance of 8c. per pound over those ruling in the first part of the year. This advance resulted from higher producing costs as represented by increases in the selling price of spelter. About the middle of June prices were named for the third quarter of the year, and they were the same as those asked for the first quarter. Declines in the spelter market brought about a downward revision of prices for the last quarter of the year. The prices were as follows: 12@12½c. per pound for red seal, 12½@12⅝c. per pound for green seal and 13@13½c. per pound for white seal.

On the first of December these prices were again revised and prices operative from December 1 and over the first quarter of 1917 were on the following basis: 17½@17⅝c. per pound for red seal, 18@18¼c. per pound for green seal, and 18½@18⅝c. per pound for white seal. There was a good demand for zinc oxide for export, but producers gave the preference to the home trade, and there was a marked falling off in the amount of stocks shipped out of the country.

Dry Colors.

As many of the raw materials used in the production of manufactured colors remained high in price it was impossible to look for a return to normal price levels for the finished colors, and another year of exceptionally high prices prevailed. Of course, the earth colors were largely independent of such conditions, but even the latter were very strong, as foreign grades advanced in price owing to the higher transportation charges and increased demand for some domestic grades placed them in a strong position. Yet a review of the color industry for the year is not without its encouraging side. Some of the colors which were brought entirely from abroad were replaced by domestic manufacture, and increased home production of some intermediates enabled color makers to secure a supply of the raw material needed for the production of certain colors. For instance, at the beginning of the year the market for pure Para toners was nominal in the absence of supplies and some manufacturers had stopped producing because they were unable to secure raw materials. A greatly enlarged domestic output of paranitraniline and beta-naphthol simplified matters and remedied the situation.

Bichromates and Prussiates.

At the beginning of the year the spot market for bichromates and prussiates was very strong, and fancy prices remained in effect for months. Color makers, who were covered by contracts, naturally were not affected by this situation, but sellers in many cases, especially on prussiates, were not able to make good on contract deliveries, and to the cost of producing blues and greens was very high, based on spot quotations for chemicals.

Prussian Blue.

Prussian blue began the year with $1.50 per pound as the quotation, and stocks were small enough to make this figure largely nominal. Later on the output gained in volume and prices eased off accordingly. There was a difference in the grades of Prussian blue placed on the market, as some manufacturers employed soda as a base while others used potash. Naturally this led to a difference in prices. Early in the spring Prussian blue was as high as $2@2.25 per pound, but at the close 90c.@$1.50 per pound represented the asking prices.

Ultramarine Blue.

Ultramarine blues were strong throughout the greater part of the period. This was partly due to higher producing costs, but largely to the sold-up position of the market. Spot goods were hard to obtain in a large way and medium grades were held at 20@30c. per pound.

Carbon Gas Black.

Carbon gas black was another color which was strengthened in price by the lack of stock. Most producers sold their output on contracts and the spot market was regulated by second hands who asked high prices for what they were able to offer. Lampblack at times was scarce, as producers also were well sold abroad. Mineral blacks were higher in price and all grades of blacks showed a net gain in price for the year.

Foreign Sienna and Umber.

Foreign grades of sienna and umber were stronger, as transportation costs were higher than usual. Domestic grades were firm at all times, with demand about normal. Chrome green went up sharply in price in the first quarter of the year and some shades commanded as high as 85c. per pound, but the market eased off as raw materials declined in price. At one time the scarcity of offerings of the color was a bullish factor, but this condition improved in the latter half of the year and stocks were more plentiful.

Chrome yellow was in a position similar to that reported for chrome green and prices advanced sharply early in the year until some shades of chemically pure were held at 58c. per pound, but later in the year prices fell to 25c. and 28c. per pound. Red oxide, tuscan red, and standard Indian reds were firm through the greater part of the period and closed the year in a strong position.

Barytes.

The marketed production of crude barytes in the United States in 1915 was 108,547 short tons, valued at $381,032. This is a notable increase over the production in 1914, which was 52,747 short tons, valued at $155,647. The increase was in large part due to the activity of the mines in Georgia, Kentucky and Tennessee. The Missouri mines made an increase of approximately 6,000 tons, but that is much below the increase in Georgia and Tennessee, which amounted to more than 15,000 tons in each State. The increase in Kentucky from a nominal quantity in 1914 to 7,753 tons in 1915 is remarkable. Alaska entered the list of producers of barytes.

The prices paid for crude barytes in 1915 varied considerably. In Georgia the average price was $3.31 a short ton; in Missouri the price was $4.05 a short ton f. o. b. cars. These prices are higher than in 1914, but the average price did not advance as much as might have been expected, one factor in keeping it down appearing to be the opening of many deposits which have been idle for some time and whose output increased the supply in 1915. It is reported, however, that the demand for crude barytes by the manufacturers of lithopone, ground barytes, and barium chemicals has been very brisk. These augmented uses for domestic material have had a marked influence on prices, and it is understood that there has been a further increase in the price of crude barytes in 1916.

Production in 1916.

The apparent stocks of crude barytes

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held at mines at the end of December, 1915, were 9,676 short tons, 6,500 of which are held in Tennessee, 2,500 tons in Georgia, and the remainder in small quantities in the other producing States. The apparent stocks in 1914 as shown by revised figures were 11,743 short tons, a large part of which was held in Tennessee.

Considerable stocks of crude barytes were held by the lithopone and chemical companies and by grinders.

According to official figures, 2,504 short tons of unmanufactured barytes were imported in 1915. This is a reduction of approximately 22,000 tons from the imports in 1914, a reduction accounted for by the loss of imports from Germany.

The apparent consumption of crude barytes in 1915 was 111,051 short tons, the sum of the marketed production and imports, which exceeded the apparent consumption of 1914 by 33,881 short tons. The marketed production of domestic barytes, approximately 50 per cent., was used by grinders, 40 per cent. by manufacturers of lithopone, and 10 per cent. by makers of barium chemicals.

Stocks in 1915.

The production of barytes in 1916 is reported to have increased over 1915, though figures are not yet available. Early in the year there was a scarcity of barytes, as imports were small and the domestic output was well sold ahead. This caused an upward revision of prices. The market held fairly steady in the latter part of the year with $25@35 per ton quoted for domestic, according to grade. Some foreign grades were held as high as $42 per ton.

Casein.

So many reports were heard during the year regarding the scarcity of imported grades of casein that the impression prevailed in many quarters that imports had been materially reduced. Reference to official figures, however, shows that the amount imported was much larger than in 1915. Reference to import figures brings out the fact that imports of cheese have been almost cut in two in the last two years. The greater demand thus created for domestic cheese increased the production of casein. Stocks of the output and proportionately cut down latter have been small at all times and a ready market was found for both domestic and foreign grades. At times prices were nominal, as the market was bare of supplies and no flat quotation was given at any time, as there is a range on a basis of quality. At the close of the year prices were held at 18@28c. per pound.

Chalk.

Prices for chalk have remained more or less nominal throughout the year. A few lots of Danish chalk were brought in, but French offerings were not available and English grades were relied upon almost entirely. Some consumers of chalk did their own importing, with all arrangements being made on the other side. Ocean freights were variable, and this is the largest item in determining prices in this country. There was no spot market, as practically all arrivals went direct to consumers. The supply of chalk, while not large enough to satisfy the needs of buyers, was not small when compared with the amounts consumed in previous years.

Average imports per annum for the past five years will run quite a little under 150,000 tons. Official figures show that 124,422 tons, valued at $104,881, reached this country from January 1 to November 30. With the amounts brought in during December it is evident that the supply was not far from normal. Demand for the products made from chalk was larger than usual, and this in turn created a wider market for the crude material, and thus caused supply to be unequal to demand.

China Clay.

Domestic grades of china clay were quoted at $8@9 per ton at the beginning of the year, but prices quickly improved, and the tone was strong during the entire period. Higher transportation rates from the mines was one factor which affected prices, and the scarcity of foreign grades at times turned consumers to the domestic offerings and helped to strengthen values. At the close of the year $12@15 per ton was the market price. Arrivals of English clay were larger than in 1915, but considerably smaller than in 1914, and consuming demand absorbed offerings without any trouble. Prices at the beginning of the year were given at $12@16 per ton, but at the close $18@25 per ton was quoted, and special bolted English clay was held at $38 per ton. There was a steady demand at all times from the various consuming trades.

Lithopone.

Reports on the production of lithopone in this country say the amount marketed in 1915 was 46,494 short tons, as against 32,819 short tons in 1914. Lithopone was reported made at eight plants, three each in New Jersey and Pennsylvania, and one each in Delaware and Illinois. The Illinois plant is new, being the only additional plant reporting a production in 1915, and not in 1914. The average price of lithophone rose from $75.89 a ton in 1914 to $80.88 in 1915, but the prices reported by different companies varied considerably.

Open market quotations for lithopone at the beginning of the year were 6¾@7c. per pound. These values did not hold good for long, and early in the period prices went to 14½@15½c. per pound. This was due to higher producing costs and to scarcity of offerings. In the later part of the year production increased, and under freer offerings prices eased off and 9@10c. per pound became the asking price. Later on selling offers became pronounced, and contracts were offered as low as 5⅞c. per pound, though some of the largest producers are said to have sold most of their output at 6@6¼c. per pound. At the close of the year spot offers were heard at 6½c. per pound, and contracts were available at 6c. per pound.

Whiting.

Consumption of whiting was restricted during the year only by the lack of offerings. Had grinders been able to supply the demand, there is no doubt that consumption would have been larger than ever before in the history of the trade. This condition was brought about not by any new outlets but the active position of the rubber and other trades which are consumers of whiting. Some producers of whiting were forced to close their plants for a time owing to their inability to secure chalk, and early in the year there were complaints from consumers that they could not secure deliveries of whiting on contracts. This was not a general condition, but was true in some cases.

With demand active and stocks limited, it was natural for prices to advance, and such was the case. Outside markets are credited with leading in the advance. At the beginning of the year 50@55c. per 100 pounds was quoted for commercial, and at the close of the year prices were quoted at 70@75c. per 100 pounds and some sellers were reported to be asking around $1 per 100 pounds for spot offerings. Prices were largely nominal as sellers were sold up and were favoring old customers.

Glues.

Developments in glue market are best explained by saying that there were no stable prices in the latter part of the year. In previous years the complaint was heard from manufacturers that raw materials were going up in price, that all other commodities were advancing, but prices for glue had been stationary for nearly the past decade. There was no trace of this position in the latter part of the year, for glue was selling at the highest prices reached in years and probably higher than at any time since the Civil War, or until the substitution of rosins made the first inroads on glue consumption.

The reasons for higher prices for glue are readily apparent. In the first place, domestic consumption has not been large enough to cover requirements without the aid of imported grades. Since the outbreak of the war in Europe German and French grades have come to this country in steadily diminishing quantities. Tariff regulations in the past few years have been unfavorable for expansion of the home production, and the loss in imports became all the more pronounced when the deficiency was not made up by an increased domestic output. The scarcity of glue stock under present conditions renders material expansion in production impossible, and the high prices asked for hides and bones has added greatly to the cost of production.

Most domestic producers were sold ahead over the last half of the year, and, in fact, some of the largest producers were reported to be oversold and were forced into the open market in order to secure supplies enough to complete contract deliveries. Offers in the spot market were thus greatly restricted and no prices could be quoted with assurance that buyers could cover at that level.

Varnish Gums.

The kauri gum industry, which was depressed following the closing of important markets in Europe during 1914, has improved under the stimulus of government aid as set forth in the kaurie gum industry amendment act, passed in November, 1914. Exports of gum from New Zealand for the first half of 1916 were 2,926 tons, and of this amount 2,311 tons went to the United States and 615 tons to all of Europe. Prices for the better grades of kauri have been firm as they are in limited supply. There was very little change in the position of the lower grade kauri gum in domestic markets during the year, but the higher grades were advanced in price. Damars were in good demand throughout the period and price changes were not important. Scarcity of ocean freights was a factor in the market later in the year, and delayed shipments of both Singapore and Batavian grades. Manila nubs and chips were strong in the latter part of the year, with good call from consumers.

Window Glass.

At the beginning of the year the window glass industry was in a very favorable position, and a good year was predicted for manufacturers. This was borne out in a large measure by late developments, though some difficulties were encountered as the year advanced. In the latter part of 1916 leading producers of window glass withdrew prices with the understanding that higher prices would go into effect in January, 1916. Early in January a complete new schedule of prices and discounts was established and the quotations on all selections showed an advance. At the beginning of the year stocks of glass in the country were relatively small. Consuming demand held up well, and there was no chance for accumulations during the year. Hence producers obtained good prices for their goods, and found a ready market. The hand-operated factories, as usual, were closed during the summer and early fall months, and this tended to prevent overproduction. Labor was scarce in the latter part of the year, and as higher wages were paid the labor question became a factor on prices. A scarcity of natural gas also was felt, and this caused some factories to reduce operations. On December 5 producers made a change in discounts, which gave them higher net returns on sales.

Leghorn Umber and Talc Markets.

TALC.—The production of Italian talc during the present year has been a little less than in previous years, owing to the consequences of war. There have also been difficulties of dispatch from the mines to point of shipment, difficulties which have recently increased, but nevertheless the export into the United States has so far been maintained active and it has reached the same importance as in 1915. Prices, however, have been advancing appreciably, not only on account of the ever increasing cost of labor, but also owing to the considerable advance in the cost of empty bags, besides the suppression of the special export tariff on our railways and a quantity of war taxes and duties. The production is nearly exclusively of the extra fine grades, as are generally required by the American importers, and the actual cost averages from $30 to $35—according to the quality—per ton, f. o. b. New York, including war risk.

UMBER EARTH.—Business in this line has been slackening considerably during the year, owing to the difficulties of output and, above all, owing to the difficulties of transportation by sailing vessels of the crude material from the island of production to Italy, where the earth is ground and manufactured. In fact, very few arrivals have been possible during the whole year, quite insufficient to meet the demand, and all buyers have had to be satisfied with a much reduced quantity. Of course, prices have undergone a material advance of 75 per cent. and more, but this would not have been a hindrance for business had the goods been available. There is no sign of improvement and it will be so until there is a change in the political situation.

NEW YORK'S 1916 NAVAL STORES MARKET IRREGULAR—FREIGHT CONGESTION BLAMED

Spirits of Turpentine.

The highest prices for turpentine were recorded during the early part of the year. Stocks at this time were relatively small, a reflection of the reduced production of 1915, and demand was quite satisfactory. The approach of the new crop producing season checked consuming inquiry, however, and along in March competition among sellers grew keener and prices weakened both here and in the South. An unfortunate feature which made itself manifest at this time was the steadily advancing ocean freight rates and the scarcity of ocean tonnage. The expected spring demand for domestic use never materialized in a manner satisfactory to dealers, because of the constant wet weather and a strike among painters all through the East. The absence of important buying interest in May and June and the practical closing of our export outlet disgusted several holders in the South, with the result that prices were cut sharply and the market settled to 42c. a gallon, the lowest figure recorded for the period under review. In July a firmer tone developed on the report that a powerful factor in the South was financing large quantities of rosin. The effect was temporary, but the market touched 49½c. a gallon on spot before the influence wore off. During August and September the market reacted to 46c. and the feeling became uncertain owing to the conservative attitude of domestic consumers and the congested export channels. Paint and varnish makers were very cautious buyers owing to the quiet demand for finished products. Linseed oil and other paintmaking materials were very high and paintmakers never experienced the demand for their products that they believed was due. Talk of peace abroad late in the year had a bullish effect on turpentine, and late in October the market started on an upward course under buying which was thought to be principally of a speculative nature. This seemed to be prompted by prospective peace reports abroad and the belief that an active export movement would develop on the suspension of hostilities. The following table shows the highest and lowest prices of spirits of turpentine at New York for each month from January 1, 1913, to December, 1916, inclusive. The figures are based on the closing quotations each successive week:

	1913.		1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.	H.	L.
Jan....	45½	42½	51	46½	47½	45½	59	56½
Feb....	46½	45½	49½	46½	45½	44½	59	53½
Mar....	47	41½	50	48	46	44½	54	53
Apr....	45	42½	48	46	48½	47½	53	42
May....	43½	41	49	46	48	42	44	42
June...	39½	38½	50½	48	44	42	44	42½
July...	39¼	38½	50	48½	43	42	49½	46½
Aug...	42	38	47½	42½	42	40	46½	46
Sept...	43	41	46	41	41	38	47	46
Oct....	45	41½	48	45	55	41	50	46
Nov....	47½	46½	46½	45½	59	57	53	50
Dec....	46½	45½	51	41	57½	54½	56	53

Rosin.

The lowest quotations for rosin during the year 1916 was reached in April. Prices had shown a declining tendency since the beginning of the year under the competitive attitude of sellers here and in the South. In April there appeared to be a dispositon to clear shelves as much as possible before the arrival of new crop, and the common grade touched $4.20 for 280 pounds. From this point a slow but persistent advance took place, which remained in progress during the remainder of the year. An offer to purchase an enormous quartity of rosin by a factor in July greatly increased confidence among holders in the South and from that time on factors displayed an indication to accumulate stocks. The fact that rosin is much easier to keep than turpentine led to considerable investment buying. Absorption by the paper mills, soap factories and munition plants during the last half of the year was heavy, and the domestic movement was sufficient to keep values in upward tendency regardless of the restricted export outlet. The market closed almost at the top prices for the year. In the following table is given the lowest and highest price of common strained rosin in the local market for each month during the past year, and for 1915 and 1914. Prices are based on the closing quotations each week and represent the unit of 280 pounds:—

	1914—		1915—		1916—	
	Low.	High.	Low.	High.	High.	Low.
Jan....	$4.00	$4.40	$3.60	$3.70	$6.00	$5.75
Feb....	4.25	4.40	3.35	3.50	5.75	5.25
Mar....	4.25	4.20	3.35	3.50	5.25	5.20
Apr....	4.20	4.10	3.50	3.50	5.20	4.20
May....	4.20	4.20	3.20	3.65	4.75	4.20
June....	4.20	4.20	3.00	3.25	5.20	4.75
July....	4.20	3.90	3.25	3.25	6.65	5.75
Aug....	4.00	3.75	3.25	3.25	6.65	6.10
Sept....	3.75	3.75	3.40	3.55	6.25	5.10
Oct....	3.75	3.75	3.65	4.50	6.45	6.25
Nov....	3.75	3.75	5.25	5.95	6.55	6.45
Dec....	3.75	3.70	5.80	5.95	6.55	6.55

Tar.

The market for kiln burned and retort tar has shown a firm position during a greater part of the year under review. The cost of production has increased materially under the scarcity of labor, while demand has been sufficient to absorb offerings without allowing any reserve accumulations to materialize. The only slack period recorded was during the months of May and June. It was stated that the constant refusal of holders to secure export tonnage resulted in moderate resales, and these brought prices down to $5.75 a barrel. From June onward the tendency was upward and late in the year the spot market became decidedly firm on a pronounced scarcity of available goods. Dealers here experienced considerable difficulty in bringing tar from the South on coastwise steamships, and at the close of the year sales were made as high as $9.50 a barrel. The following table shows the highest and lowest in the New York market for kiln-burned tar in oil barrels, of fifty gallons, for each month from January, 1913, to December, 1916, inclusive:—

	1913.		1914.		1915.		1916.	
	H.	L.	H.	L.	H.	L.	H.	L.
Jan.....	$6.75	6.25	$7.75	7.50	$6.00	6.00	$6.50	6.00
Feb....	6.75	6.25	7.50	7.00	6.00	6.00	6.50	6.00
Mar....	6.75	6.25	7.00	6.75	6.00	5.00	6.50	6.00
Apr.....	6.75	6.25	7.50	7.00	5.00	5.00	6.50	6.00
May.....	6.00	5.75	7.50	6.75	5.00	5.00	6.50	6.75
June....	6.25	6.00	7.25	6.50	5.00	5.00	6.00	5.75
July.....	7.50	5.75	6.75	6.00	5.00	5.00	7.25	6.00
Aug.....	7.50	6.50	6.50	6.50	5.00	5.00	7.25	7.00
Sept....	8.00	7.00	7.00	6.50	5.25	5.25	7.50	7.00
Oct.....	7.50	7.00	7.00	6.50	6.00	5.25	8.25	7.50
Nov.....	8.00	7.25	7.00	6.50	6.50	6.00	8.25	8.00
Dec.....	8.00	7.75	6.50	6.00	6.50	6.00	9.50	8.25

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TABLE NO. 1.

Gives the Lowest and Highest Prices for Each Month in London.

	1913		1914		1915		1916	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
January	31 3	32 3	32 1½	33 6	35 9	38 9	48 9	57 3
February	31 6	32 6	31 9	32 4½	38 0	43 0	46 3	50 6
March	27 0	31 4½	32 0	32 6	36 6	43 0	46 3	51 6
April	28 3	29 6	31 1½	32 3	36 3	37 7½	44 6	51 0
May	28 4½	29 6	30 10½	33 9	33 6	37 0	41 3	44 0
June	27 6	28 4½	32 6	34 3	33 6	39 0	38 6	42 6
July	27 4½	28 3	33 4½	34 4½	34 0	40 6	38 6	42 0
August	27 3	30 4½	33 6	38 6	33 9	34 9	41 3	42 10½
September	29 6	30 6	29 0	34 0	33 9	35 10½	42 0	43 9
October	29 9	31 10½	30 3	32 6	34 3	41 3	42 9	44 9
November	31 6	32 7½	31 3	36 0	39 9	44 9	44 3	49 4½
December	31 9	32 6	33 3	36 5	44 9	54 0	48 6	55 3

TABLE No. 2.

The average price of American turpentine in London was as under:—

1910.	1911.	1912.	1913.	1914.	1915.	1916.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
47 8	47 9	33 1	30 1	33 0	38 5	45 10

TABLE No. 3

The total exports from United States were as under:—

(320 American gallons, calculated as one English ton equals 1,016 kilos.)

	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.
1911-1912	58,980	*37,717	†21,263	1914-1915	36,014	*25,952	†10,962
1912-1913	63,957	*46,580	†17,377	1915-1916	30,102	*22,285	†7,817
1913-1914	59,027	*41,898	†17,129	1916-1917	....	....	....

N. B.—The American crop year begins April 1 and ends March 31.

* Seven months, April-October. † Five months, November-March.

TABLE NO. 4.

Analyzes the Imports Into Great Britain from All Countries.

From—	1911. Tons.	1912. Tons.	1913. Tons.	1914. Tons.	1915. Tons.	1916. Tons.
United States	18,181	28,757	23,829	14,725	20,902	18,429
France	1,183	899	1,683	975	2,025	261
Portugal and Spain	260	313	205	271	3,337	2,849
Russia, Scandinavia, etc.	4,344	2,798	1,769	1,210	211	....
All other foreign countries	38	44	450	225	....	....
Tons of 1,016 kilos	24,006	32,811	28,017	17,410	26,475	21,539
Percentage from—						
United States	75.73	87.64	85.02	84.57	78.95	85.56
France	4.93	2.74	6.00	5.60	7.65	1.21
Russia and Baltic	18.10	8.53	0.32	6.95	.80	Nil
All other countries	1.24	1.09	2.66	2.88	12.60	13.23

TABLE No. 5

Stocks of turpentine in London at the end of each year were:—

	1911. Bbls.	1912. Bbls.	1913. Bbls.	1914. Bbls.	1915. Bbls.	1916. Bbls.
American	24,686	47,300	56,253	22,148	32,952	36,785
French	1,569	2,028	4,224	1,878	1,341	521
Spanish, etc.	276	377	374	340	7,486	7,689
	26,531	49,705	60,851	23,866	41,779	44,995
Afloat	14,188	5,050	4,000	....	....	....
Totals	40,719	54,755	64,851	23,886	41,779	44,995
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Price in London	37 4½	31 9	32 6	36 3	54 0	53 0
Price in Savannah	50½c.	39c.	42¾c.	42½c.	54c.	52c.

ROSIN.

A new record has been established (i. e., since the American war of secession); during the month of December 25s. 6d. was paid for strained rosin, ex-wharf London.

This is due to high freights, and the demand for munitions; also to efficient control by a powerful group of American factors and exporters, with substantial financial backing, who, grasping the possibilities of the situation, are profiting thereby.

TABLE No. 6

Average monthly quotations of strained rosin. Price per cwt., 50¾ kilos, ex-wharf, London.

	1911. s. d.	1912. s. d.	1913. s. d.	1914. s. d.	1915. s. d.	1916. s. d.
January	15 9	17 1½	14 7½	9 11	11 1½	22 3½
February	17 3	16 9	15 10	10 0	11 8	22 3
March	18 9	16 9	14 3	9 9	11 3½	21 4
April	19 3	17 0	12 8	9 6½	12 0	21 3
May	17 3	16 6	11 9	9 6	12 8	21 0
June	16 0	16 6	11 1½	9 5½	12 2	21 3
July	14 6	15 10½	10 11	9 3½	12 2	21 0
August	14 7½	16 5	10 6	11 0	11 9½	21 3
September	13 6	16 6	10 3½	9 6½	12 2	21 6
October	15 6	16 4½	9 4½	8 2½	13 11½	21 6
November	15 4½	15 9	9 7½	8 7½	18 3½	21 9
December	16 1½	15 2	9 9	9 4	21 6	24 5
Average of year	16 4	16 6	11 9	9 6	13 5	21 9

TABLE No. 7

The total exports from United States were in tons of 2,240 lbs.=1,016 kilos, net weight.

	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.
1912-1913	253,072	*151,785	†101,287	1915-1916	155,268	*86,387	†68,881
1913-1914	262,673	*163,125	†99,548	1916-1917	....	....	....
1914-1915	146,453	*104,335	†42,118				

N. B.—The American crop years begins April 1 and ends March 31.

* Seven months, April-October.

† Five months, November-March.

TABLE NO. 8.

Analyzes the Imports Into Great Britain from All Sources.

From—	1910. Tons.	1911. Tons.	1912. Tons.	1913. Tons.	1914. Tons.	1915. Tons.	1916. Tons.
United States	48,381	50,089	50,763	66,651	53,907	52,961	75,745
France	16,987	13,250	17,742	9,672	16,182	37,856	14,580
Spain and Portugal	8,160	8,644	10,091	8,350	6,224	10,579	9,550
All other countries	1,503	2,288	3,473	3,230	1,096	1,047	215
Total tons of 2,240 lbs. (equals 1,016 kilos)	75,031	74,271	82,069	87,903	77,403	102,413	100,090
Percentage from—							
United States	64.45	67.44	61.85	75.82	69.64	51.68	75.64
France	22.64	17.84	21.62	11.00	20.91	36.97	14.57
Other countries	12.88	14.72	16.53	13.18	9.45	11.35	9.75

Savannah.

TURPENTINE.

The following table contains the high and low prices for spirits of turpentine at Savannah for each month during 1915. The price represents the closing figure each week and is on the gallon basis:—

	High.	Low.
January	$0.56	$0.54
February	.55	.50½
March	.51⅛	.50
April	.50	.44½
May	.38½	.35¾
June	.39	.38
July	.43¼	.38
August	.42⅞	.42½
September	.43¾	.42⅝
October	.44½	.43½
November	.50	.46¾
December	.52¼	.49½
Year	.56	.38

Visible supply at beginning of season, April 1, 1915, at Savannah, 22,666 barrels, compared with 12,018 barrels for the same period, 1914. Supply December 31, 1915, was 15,888 barrels, compared with 35,993 barrels same time 1914.

ROSIN.

The high and low prices for B rosin for the year 1915 are tabulated below. Quotations are based on the closing figures each successive week and represent the cost per 280-pound barrel on spot.

	High.	Low.
January	$5.70	$5.30
February	5.20	5.00
March	4.80	4.75
April	4.70	4.40
May	4.35	3.85
June	5.00	4.85
July	6.00	4.75
August	5.90	5.80
September	5.85	5.80
October	6.20	5.85
November	6.35	6.15
December	6.30	6.17½
Year	6.35	3.85

Visible supply at Savannah at beginning of crop season, April 1, 1915, was 105,333 barrels, compared with 110,425 barrels same time in 1914. Supply December 31, 1915, was 75,439 barrels, compared with 150,283 barrels same time in 1914.

Jacksonville.

TURPENTINE.

	High.	Low.
January	$0.55½	$0.54
February	.54½	.50
March	.50½	.50
April	.49	.46
May	.40	.38
June	.38½	.38
July	.42⅛	.37½
August	.64¼	.42
September	.43½	.41⅜
October	.44¼	.42¾
November	.49	.46¼
December	.52½	.49¼
Year	.64¼	.37½

ROSIN.

	High.	Low.
January	$5.60	$5.20
February	5.30	5.00
March	5.00	4.80
April	4.90	4.00
May	4.00	4.00
June	5.00	4.80
July	5.75	5.00
August	5.60	5.30
September	5.72½	5.55
October	6.05	5.85
November	6.20	6.05
December	6.20	6.05
Year	5.75	4.80

London Rosin and Turpentine in 1916.

Turpentine.

The year 1916 opened on the full tide of a great rise, due to unduly low prices prevalent during June-October of 1915, in the face of greatly diminished supplies, says James Watt & Sons' annual review of the market.

This rise was pushed to extremes; early in January 67s. 3d. was touched, although it was then known that the 1916 crop in the United States would be considerably larger than that of 1915; that the Spanish competition on the British markets was very keen, and that our home trade was poor.

Prices in London soon declined, and gradually dwindled to 38s. 6d. in July.

Later in the year, however, other considerations outweighed the foregoing:—

1. London had to supply not only the somewhat poor demand of her own immediate zone, but the requirements of the East Coast of the United Kingdom, and also of Rotterdam and Amsterdam. Owing to the war these ports have received hardly any direct imports from America during 1916.

2. Ocean freights and war risk insurance rose to abnormal limits, and they are still rising.

3. Mercantile prosperity in the United States caused increased domestic demand and speculative holding there.

4. The export from France to the United Kingdom was a negligible quantity all the year.

But in the autumn France appeared as an importing country, buying several thousand barrels from Spain! In spite of the customs duty, France was able to pay a better price for Spanish turpentine than Britain could afford.

This made a great impression in London where the large supply of Spanish had, for a long time, been the Skeleton at the American feast.

5. The attention of many speculators was attracted to turpentine. At 45s. it seemed to be at a low price compared with those of other cognate articles, which had greatly advanced since the war.

A large business in "futures" ensued, and it still continues to be very active.

In April a new clause was added to the association contract protecting sellers of "futures" from unconscionable damages in the event of the destruction of turpentine, by aircraft or fire, at a wharf at which they might be holding stock, against such sales, at the time of the disaster.

Both Rosin and Turpentine Prices Rose at Year's Close in London.

Turpentine steadily declined in the first half of the year, but recovered in the second period at first slowly, but towards the end smartly. Rosin was a fairly even market until it rapidly bestirred itself in November and December. Summarized on the basis of weekly prices values have been:—

Turpentine, spot, American:—Cwt., opened, 52s.; closed, 54s.; high, 54s.; low, 38s. 9d.

Rosin, common, strained:—Cwt., opened, 22s.; closed, 25s. 6d.; high, 25s. 6d.; low, 21s.

Record of Prices by Week.

The course of the market is indicated by the following record of prices at about the middle of each week:—

		1916 Turpentine, American, cwt., spot. s. d.	1916 Rosin, common strained, cwt., spot. s. d.
January	1	52 0	22 0
	6	57 3	22 3
	13	54 4½	22 3
	20	53 3	22 3
	27	51 9	22 6
February	3	50 6	22 6
	10	49 0	22 6
	17	48 0	22 6
	24	47 3	22 6
March	2	46 6	21 9
	9	47 0	21 3
	16	49 9	21 3
	23	50 9	21 3
	30	48 3	21 3
April	6	48 9	21 3
	13	46 4½	21 3
	20	46 9	21 3
	27	45 0	21 0
May	4	44 0	21 0
	11	41 9	21 0
	18	43 0	21 0
June	25	43 0	21 0
	1	42 6	21 0
	8	42 3	21 0
	15	41 0	21 6
	22	40 0	21 6
	29	38 9	21 0
July	6	39 9	21 0
	13	41 9	21 0
	20	40 6	21 0
	27	41 3	21 0
August	3	41 10½	21 0
	10	42 0	21 0
	17	42 6	21 6
	24	42 4½	21 6
	31	42 9	21 6
September	7	43 3	21 6
	14	43 6	21 6
	21	43 0	21 6
	28	42 9	21 6
October	5	44 4½	21 6
	19	44 0	21 6
	26	43 9	21 6
November	2	44 4½	21 6
	9	44 10½	21 6
	16	45 0	21 6
	23	49 4½	22 0
	30	49 0	22 6
December	7	50 0	23 6
	14	55 3	24 6
	21	53 6	25 6
	28	54 0	25 6

PETROLEUM INDUSTRY OF UNITED STATES EXPERIENCED REMARKABLE YEAR IN 1916

Production of Crude Oil Approximated 306,000,000 Barrels —Exports of Mineral Oils Totaled 2,583,037,822 Gallons, a Gain of About 275,000,000 Gallons Over the Previous Year.

Production of Crude Oil in 1914, 1915 and 1916.

Fields.	Barrels 1916.	1915.	1914.
Eastern fields	20,724,836	20,333,483	22,436,771
Ohio-Indiana	2,606,831	3,979,467	4,603,275
Illinois	16,349,274	15,588,493	19,330,245
Kentucky-Tennessee	1,244,752	479,366	516,110
Mid-Continent	122,671,767	121,988,915	101,002,263
Gulf coast	21,848,115	20,355,259	11,980,000
Texas Panhandle	8,852,865	5,591,422	8,513,367
Northern Louisiana	11,848,301	14,730,713	12,507,436
California	91,916,019	89,725,776	102,871,907
Wyoming	8,030,000	5,164,737	4,360,000
Other States	205,000	200,000	180,000
Totals	306,297,760	298,137,631	287,119,667

THE figures as above shown are those for the production of petroleum in this country for the year 1916, as compiled from the reports of the correspondents of the Reporter in the several fields, which will be found in subsequent pages. There is always more or less variance in these figures, which are of necessity based on pipeline and field records, and the statistics as issued by the government vary in similar manner. The present Congress is expected with an appropriation provided for to authorize the monthly presentation of petroleum statistics from all sections of the country, and these figures may be available at the time next year's Review Number is issued. It is interesting to note in this connection, however, that in the government figures of the exoptrs of mineral oils for the years 1914 and 1915, and the figures for the same period prepared by another government bureau, there is a variance of millions of gallons.

The United States Geological Survey petroleum figures for 1916 and 1915 are given herewith as a matter of comparison, and an immediate variance of about 14,000,000 barrels is seen, but it must be remembered that these Geological Survey figures are based on the marketed production and that the figures compiled from Reporter tabulations are for the total, including additional stocks, &c.

Government Estimates.

The government figures for the two years, 1915, 1916, are shown in the following table, by States, in barrels of 42 gallons each:—

State.	1915.	1916.
Oklahoma	97,915,243	105,000,000
California	86,591,535	89,000,000
Texas	17,467,598	26,000,000
Illinois	19,041,695	16,500,000
Louisiana	18,191,539	16,800,000
West Virginia	9,264,793	8,500,000
Pennsylvania	7,838,705	8,000,000
Ohio	7,525,320	7,400,000
Kansas	2,823,487	6,500,000
Wyoming-Montana	4,245,525	6,300,000
Kentucky	437,274	1,200,000
Indiana	875,758	1,000,000
New York	887,778	900,000
Colorado	208,475	190,000
Other States	14,265	10,000
Totals	281,104,104	292,300,000

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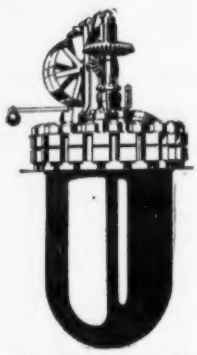

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Be sure you have a copy of our bulletin No. 105 descriptive of apparatus required by the Chemical and Allied Industries. A copy will be sent you for the asking.

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Jacketed Tanks
Extractors
Reduction Kettles
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Fusion Kettles
Vacuum Pans
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Filters
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Percolators
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Tanks of all description

NEW YORK: 42nd Street Building

Jas. Livingston, Ltd., LONDON

Stocks on Hand January 1, 1917.

The situation in the industry as regards production and consumption can be seen by the following table of stocks on hand at the end of 1916:—

Field.	Stocks, barrels— 1916.	1915.
Pennsylvania grades...	4,136,214	6,739,493
Franklin, Pa.....	39,715	41,092
Southeastern Ohio.....	571,889	614,501
Cleveland, Ohio.....	1,425	209
Northwestern Ohio.....	2,524,874	2,231,889
Indiana	840,469	1,015,814
Illinois	2,755,533	5,214,644
Kentucky	197,557	109,258
Kansas-Oklahoma	91,774,458	94,519,681
California	43,640,394	55,977,180
Texas-Panhandle	561,304	.....

These figures while not complete are indicative of the great call that has been made upon the stocks of crude in storage, owing to the immense consumption and the demand for the refined products both for domestic and export purposes.

Field Operations for the Year 1916.

	Comp.	Prod.	Dry.	Gas.
Pennsylvania	3,049	10,774	306	254
West Virginia.....	1,795	24,450	296	432
Illinois	1,459	24,713	317	36
Southeastern Ohio.	1,375	9,582	411	76
Kentucky	1,071	26,973	179	16
Northwestern Ohio	699	9,301	69	10
Central Ohio.....	469	1,045	111	322
Indiana	267	3,554	98	8
Tennessee	20	45	18	..
Totals	10,204	110,437	1,804	1,154
Mid-Continent	11,241	674,731	1,491	476
Gulf coast.....	731	488,640	412	..
North Texas.....	515	54,740	115	53
Texas Panhandle..	590	47,208	110	60
North Louisiana...	550	55,930	150	60

The Export Situation.

Despite the fact that the year was marked by most unusual conditions in the ocean freight fields, owing to wartime conditions, scarcity of carriers and tremendously high rates, the exports for the year of all varieties of mineral oil reached the enormous total of 2,607,491,209 gallons, valued at more than $201,732,500. A detailed analysis of the exports with the totals by months with countries of destination will be found elsewhere in this review, but the yearly totals of the various sub-divisions in the mineral oil export summary will be found of interest:

Total mineral oil, 12 months ending	1916. Gallons.	1915. Gallons.
January 1, 1917...	2,607,491,209	2,328,725,649
Crude oil	172,029,903	158,263,089
Illuminating oil	854,403,313	836,158,965
Lubricating and paraffine	260,779,127	239,678,725
Gasoline	167,928,262	112,562,929
Naphthas, etc.....	188,288,863	169,046,052
Gas and fuel oil.....	957,518,417	799,589,047
Residuum	6,543,324	12,027,162

What the Prodution Figures Show.

As a whole, the petroleum report of the year just closed does not indicate that the new pools and new districts heralded during the year have developed sufficient production to offset in large measure the decline of the older fields. Kansas made up in production what Oklahoma lost, leaving the Mid-Continent field at about a parity with last year. The Eastern fields showed a decline, while the Kentucky-Tennessee division displayed an appreciable gain. The Texas Panhandle showed an increase of more than half last year's total, and while the figures from Wyoming are not complete there is a good gain indicated there. Had there been pipeline facilities in Wyoming there would have been another story, for the oil was there, without means to get it to market.

Despite the fact that California has been facing a situation during the entire year caused by the production not equalling the consumption, there was a good gain in production over last year. The banner for marked increase in output goes to Kansas, with an increase of more than 9,000,000 barrels, owing to the development of the Butler county pools. To the contrary, the greatest loss during the 12 months was in Oklahoma, which fell away nearly 12,000,000 barrels from its last year's total, and yet retains its position as the greatest producer of all the petroleum producing States.

Centers of New Production.

The principal centers of the new production during the year were: Butler county, Kansas; Carter county, Oklahoma; Estill and Allen counties, Kansas; Converse, Park and Natrona counties, Wyoming. The greatest wildcat activity was manifested in Kansas, Oklahoma, Texas and Wyoming, and in Kentucky, while the search for new oil areas sent hundreds of prospectors combing possible oil lands in Tennessee.

In Pennsylvania the extension of the Dorseyville pool, in Allegheny county, was drilled by a number of wells. At the end of the year interest was centered in Springhill Township, Green county, where a wildcat test on the George Isminger farm, completed early in December as a 200-barrel oil well, was interpreted as indicating the discovery of a new pool.

In West Virginia the most important results of field activity in 1916 include the discovery and partial development of a rich pool of oil in the thirty-foot sand on Dents Run, near Mannington, Marion county; and the proof of a northeastward extension of the Berea sand pool in the Cabin Creek district, Kanawha county.

The petroleum output of Kentucky was increased as a result of the success attending the search for extensions of the Irvine pool in Estill county, and of the Scottsville petroleum district, in Allen county.

In Tennessee late in September it was reported that oil in commercial quantities had been discovered in a well drilled near Glenmary, in the southern part of Scott county, about 15 miles southwest of Oneida.

Eastern Ohio.

The mainstay of oil production in Eastern Ohio in 1916 was the Union Furnace district, in Hocking county. A gas field of considerable yield was developed in Jackson and Richland townships, Vinton county. Southwest of Cleveland, Cuyahoga county, a number of oil wells of small capacity were completed.

The best results in the Lima district of Northwestern Ohio were obtained in the Tiffin field, Seneca county. In Indiana the bulk of the field activity in 1916 was in the southwestern part of the State.

No developments of consequence resulted from drilling activity in Illinois in 1916, and an appreciable decline in oil production was recorded.

The drilling campaign in the Mid-Continent region, inspired by the decline of Cushing and the prompt advance of the crude oil market, was so successful that Oklahoma was enabled to retain prior rank as an oil-producing State, while Kansas made an even better showing.

The discovery of a prolific "pay" below the Bartlesville sand in the Cushing district, Creek county, Oklahoma, and the completion of a great number of gusher wells in the Shamrock or south extension of that district, together with the successful development of the Augusta and Eldorado fields, in Butler county, Kan., caused the overproduction that depressed the market for all high-grade crude oil east of the Rocky Mountains during the summer and early part of the fall.

In Kansas the Augusta and Eldorado districts were the centers of drilling activity. Significant discoveries of oil were made in Kansas near Beaumont, Greenwood county, and northwest of Winfield, in Cowley county. In the old shallow-sand fields of Kansas drilling activity was attended by favorable results in the Paola district, Miami county, and the Wellsville district, Franklin county.

Central and Northern Texas.

An increase in drilling throughout Central and Northern Texas, the discovery of a productive deep sand at Electra and the extension of the productive area at Burkburnett resulted in an appreciable increase in output. Wildcat activity resulted in promising discoveries of gas on the Hess and Edmonson ranches, in northern Palo Pinto county, of oil and gas near Caddo and Breckenridge, Stephens county, and of oil near Holliday, Archer county.

Northern Louisiana.

The important developments in Northern Louisiana in 1916 include, in Caddo parish, the extension of productive territory in the Mooringsport district, south of Caddo Lake, to the south and west, and the completion of a number of prolific gas wells in the new district south of Shreveport; in De Soto parish, the discovery of an undefined area of promising oil production in the vicinity of Logansport, near the Texas boundary; in Red River parish, the discovery of new oil territory in the Grand Bayou district, southwest of the Crichton field; in Bossier parish, the discovery of an important source of gas near Elm Grove, west of Lake Bisteneau, and in Morehouse parish, the discovery of a gas field of promise a few miles southwest of Bastrop.

Gulf Coast Region.

Humble easily retained first rank in activity and of production among the salt-dome pools of the Gulf coastal plain, despite a waning of supply from deep sands. The completion late in October of a 6,000-barrel oil well, at a depth of about 2,000 feet, in the Goose Creek pool, made it the center of drilling activity.

The petroleum output of Wyoming was materially increased in 1916 as a result of the installation of a refinery at Greybull, Big Horn county, by the Greybull Refining Company, and of the completion of a pipeline by the Illinois Pipe Line Company from the Elk Basin field, in northern Park county, to the Burlington Railroad at Frannie.

The most notable development of the year in Wyoming was the opening of a new oil field on the Big Muddy anticline, in western Converse county.

California.

A moderate increase in production was the response of California's oil fields to the steady advance in prices that was the principal feature of the crude oil market in this State. Drilling activity in all fields was nearly twice as great as in 1915, but the size of the new wells completed contrasted strongly with those of three and four years ago. The scarcity of oil of fuel grades resulted in especial activity in the Kern River and McKittrick fields.

A detailed analysis of every feature of the field work during the year will be found on subsequent pages of this report.

Crude Oil Market in 1916 More Exciting Than Field Reports.

With Pennsylvania crude oil starting the year at $2.25, from which point it rose steadily to $2.60 in March, only to drop back as steadily to $2.30 August 15, but to swing back at regular 10-cent intervals to a high $2.85 on December 29, the whole story of the movement of crude oil prices in 1916 is set before the readers of the Reporter. That the price has since climbed to $3.05, the highest point attained in 40 years, is 1917 history and prophecy combined, and not to be included in the present report.

At the outset of 1916 the prospects for good prices—increasing prices—were bright, for the famous Cushing pool in the Oklahoma-Kansas territory was declining rapidly, the demand for petroleum and all its products was increasing at a surprising rate, and production was falling away. Hence the producer looked for a prosperous year and "pushed his prosperity."

The result was what could have been expected. By the latter part of March the producers were pouring out a flood of oil, despite the fact that prices had steadily advanced, and then a series of gushers were brought in in the Augusta pool, and gave warning that a large productive territory had been opened. Pipeline and production experts gave warning after warning that something must be done to limit the production if prices were to be maintained, but the wildcater and the barrel-hogger could see little beyond the top of his derrick—and could not see the bottoms of his tanks—and the cut came. By this time—the latter part of July—both the Augusta and Eldorado pools had extended the limits of their territory. Cut followed cut, the amount to be taken by the pipelines was reduced twice, and then on August 15 the bottom was touched, with Pennsylvania at $2.30; with other Eastern grades at proportionate figures; Kansas was at 95, later to hit 90 before halting, with Caddo 10 cents lower.

For nearly six weeks prices remained quiescent at these figures, and then, on September 28, the Pennsylvania group started its recovery by a 10-cent uplift—a recovery which sent its year-end prices to points undreamed of during the past decade, and not touched since 1877.

The outlook to-day is considered even brighter than in the early part of 1916. The older fields have been combed so closely that there is less prospective territory there than ever before. Wyoming yet remains to be reckoned with, but millions of dollars must be expended there for pipelines, refineries and other properties before the oil producers of that State reach their stride.

The record of price changes for the year, in all the fields for which the Reporter prepares quotations, is as follows:—

Year's Opening and Closing Field Prices.

A comparison of last year's opening and closing quotations follows:—

EASTERN STATES.

	Per barrel— Opening.	Closing.
Pennsylvania	$2.25	$2.85
Cabell, Pa.....	1.78	2.22
Mercer, black.....	1.75	2.50
New Castle, Pa.....	1.75	2.15
Corning, Ohio.....	1.75	2.25
Somerset, Ky.....	1.63	2.05
Ragland, Ky.....	.75	.95

CENTRAL WEST.

	Per barrel— Opening.	Closing.
Wooster	$1.50	$1.80
North Lima, Ohio.....	1.33	1.58
South Lima, Ohio.....	1.33	1.58
Indiana	1.18	1.43
Princeton, Ind.....	1.47	1.62
Illinois	1.47	1.62
Plymouth	1.33	1.33

OKLAHOMA-KANSAS.

	Per barrel— Opening.	Closing.
All grades except Healdton...	$1.20	$1.40
Healdton, 32 deg. and above..	.60	.75

NORTHWESTERN LOUISIANA.

	Per barrel— Opening.	Closing.
Caddo, La., 38 deg. and above	$1.20	$1.40
35 to 37.9 deg.....	1.10	1.30
32 to 34.9 deg..... heavy	1.05	1.25
	.75	.85
De Soto.....	1.10	1.10
Crichton	.85	1.10

NORTH TEXAS.

	Per barrel— Opening.	Closing.
Corsicana, light.....	$1.20	$1.40
heavy	.60	.75
Electra	1.20	1.40
Henrietta	1.20	1.40
Strawn	1.05	1.40
Thrall	1.05	1.40
Moran	1.05	1.40

GULF COAST.

	Per barrel— Opening.	Closing.
Humble	$0.50	$0.80
Saratoga	.50	.70
Sour Lake.....	.50	.80
Spindletop	.50	1.05
Batson	.50	.70
Vinton	.60	.80
Dayton	.50	.70
Goose Creek.....	.50	.70
Jennings	.45	.80
Markham	.50	.75
Edgerly	.50	.95

CALIFORNIA.

	Per barrel— Closing.	Opening.
Kern River, Midway-Sunset, McKittrick, Lost Hills-Belridge, Coalinga—		
14 to 17.9 deg.....	$0.73	$0.43
18 to 18.9 deg.....	.74	.44

Prices are 1c. higher per barrel for each increase in gravity of one full degree above 18 degrees to and inclusive 24.9 degrees.

25 to 25.9 deg.....	.82	..

Prices are 2c. higher per barrel for each increase in gravity of one full degree above 25 degrees.

Ventura county—

25 to 25.9 deg.....	.82	.67

Prices are 2c. higher per barrel for each increase in gravity of one full degree above 18 degrees to and inclusive of 36.9 degrees.

Fullerton and Whittier and Santa Maria—

14 to 17.9 deg.....	.73	.48
18 to 18.9 deg.....	.74	.49

Prices are 1c. higher per barrel for each increase in gravity of one full degree above 18 degrees.

25 to 25.9 deg.....	.82	..

Prices are 2c. higher per barrel for each increase in gravity of one full degree above 25 degrees.

Oil of above 37 deg. gravity 6c. higher, with increases of 3c. per barrel for each full degree above 37 deg. gravity.

CANADA.

	Per barrel— Closing.	Opening.
Canada	$1.98	$1.73
Petrolia	1.88	1.33
Oil Springs.....	1.95	1.40

Crude Market Changes for the Year.

The crude market changes during the year were as follows:—

First Grade Pennsylvania.

January 1.....	$2.25	August 10.....	$2.35
January 28.....	2.35	August 15.....	2.30
February 21.....	2.40	September 28.....	2.40
March 6.....	2.50	October 10.....	2.50
March 17.....	2.60	October 20.....	2.60
July 29.....	2.50	December 5.....	2.75
August 3.....	2.40	December 29.....	2.85

Mercer Black.

January 1.....	$1.75	August 10.....	$1.85
January 28.....	1.85	August 15.....	1.80
February 21.....	1.90	September 28.....	1.90
March 6.....	2.00	October 10.....	2.00
March 17.....	2.10	October 20.....	2.20
July 29.....	2.00	December 5.....	2.20
August 3.....	1.90	Denember 29.....	2.30

Cabell.

January 1.....	$1.78	August 10.....	$1.87
January 28.....	1.88	August 15.....	1.82
February 21.....	1.95	September 28.....	1.92
March 6.....	2.02	October 10.....	2.02
March 17.....	2.12	October 20.....	2.12
July 29.....	2.02	December 5.....	2.17
August 3.....	1.92	December 29.....	2.22

Corning.

January 1.....	$1.75	August 10.....	$1.85
January 28.....	1.85	August 15.....	1.80
February 21.....	1.90	September 28.....	1.90
March 6.....	2.00	October 10.....	2.00
March 17.....	2.10	October 20.....	2.10
July 29.....	2.00	December 5.....	2.20
August 3.....	1.90	December 29.....	2.25

New Castle.

January 1.....	$1.75	August 3.....	$1.90
January 28.....	1.85	August 10.....	1.85
February 21.....	1.90	August 15.....	1.80
March 6.....	2.00	September 28.....	1.90
March 17.....	2.10	October 10.....	2.00
July 29.....	2.00	(See note.)	

New Castle as a separate quotation was dropped in the early part of October.

Somerset.

January 1.....	$1.63	August 10.....	$1.70
January 28.....	1.73	August 15.....	1.65
February 21.....	1.78	September 28.....	1.75
March 6.....	1.85	October 10.....	1.85
March 17.....	1.95	October 20.....	1.95
July 29.....	1.85	December 5.....	2.00
August 3.....	1.75	December 29.....	2.05

Ragland.

January 1.....	$0.75	August 3.....	$0.75
January 28.....	.80	September 28.....	.80
February 21.....	.82	October 10.....	.85
March 6.....	.85	October 20.....	.90
March 17.....	.90	December 5.....	.95
July 29.....	.80	December 29.....	.95

North and South Lima.

January 1.....	$1.33	July 28.....	$1.63
January 3.....	1.43	August 1.....	1.58
January 22.....	1.48	August 4.....	1.48
January 27.....	1.53	August 14.....	1.43
February 7.....	1.58	November 18.....	1.48
March 7.....	1.63	December 13.....	1.53
March 16.....	1.73	December 19.....	1.58

Indiana.

January 1.....	$1.18	July 28.....	$1.48
January 3.....	1.28	August 1.....	1.43
January 22.....	1.33	August 4.....	1.33
January 27.....	1.38	August 14.....	1.28
February 7.....	1.43	November 18.....	1.33
March 7.....	1.48	December 13.....	1.38
March 16.....	1.58	December 19.....	1.43

Illinois-Princeton.

January 1.....	$1.47	August 1.....	$1.62
January 3.....	1.57	August 4.....	1.52
January 27.....	1.62	August 14.....	1.47
February 16.....	1.72	November 18.....	1.52
March 16.....	1.82	December 13.....	1.57
July 28.....	1.72	December 19.....	1.62

Plymouth.

January 1.....	$1.33	August 7.....	$1.28
January 21.....	1.38	August 14.....	1.18
January 27.....	1.43	August 17.....	1.08
March 6.....	1.53	August 28.....	1.03
March 13.....	1.58	November 30.....	1.13
March 16.....	1.68	December 15.....	1.23
July 28.....	1.58	December 19.....	1.33
August 1.....	1.48	December 28.....	1.43
August 3.....	1.38	December 29.....	1.53

Wooster.

January 1.....	$1.50	July 28.....	$1.90
January 3.....	1.60	August 1.....	1.80
January 22.....	1.65	August 4.....	1.70
January 27.....	1.70	August 14.....	1.65
February 7.....	1.75	November 18.....	1.70
March 7.....	1.80	December 13.....	1.75
March 16.....	1.90	December 19.....	1.80
May 19.....	2.00		

Oklahoma-Kansas.

January 1.....	$1.20	August 7.....	$1.15
January 20.....	1.25	August 12.....	1.05
January 26.....	1.30	August 15.....	.95
March 4.....	1.40	August 26.....	.90
March 11.....	1.45	November 29.....	1.00
March 14.....	1.55	December 12.....	1.10
July 25.....	1.45	December 18.....	1.20
July 29.....	1.35	December 23.....	1.30
August 1.....	1.25	December 29.....	1.40

The Nelson Electrolytic Cell

For the manufacture of

Chlorine Gas *and* Caustic Soda

This cell possesses the following advantages:

(1) Low expense of installation, maintenance and repairs.

(2) Simplicity of construction and operation.

(3) High efficiency.

Our latest 280 cell installation—producing dry, practically air-free chlorine

Estimates furnished covering complete installation and cost of producing chlorine, based on the amount of chlorine it is desired to produce and on your values for power, salt, coal and labor.

All representations guaranteed on operation over a period of years and can be confirmed by observation of cells in use.

The Warner Chemical Co.

52 Vanderbilt Avenue New York

Healdton.

January 1	$0.60	August 14	$0.45
January 7	.65	August 16	.40
January 21	.70	November 30	.45
January 27	.75	December 13	.50
March 13	.80	December 19	.60
July 25	.70	December 23	.70
July 31	.60	December 29	.75
August 2	.50		

Caddo, 38 Degrees and Above.

January 1	$1.20	August 8	$1.15
January 25	1.25	August 14	1.05
January 28	1.30	August 17	.95
March 8	1.40	August 29	.90
March 15	1.45	December 2	1.00
March 27	1.55	December 14	1.10
July 25	1.45	December 19	1.20
August 1	1.35	December 27	1.30
August 2	1.25	December 29	1.40

Caddo, 35 to 37.9 Degrees.

January 1	$1.10	August 8	$1.05
January 25	1.15	August 14	.95
January 28	1.20	August 17	.85
March 8	1.30	August 29	.80
March 15	1.35	December 2	.90
March 27	1.45	December 14	1.00
July 25	1.35	December 19	1.10
August 1	1.25	December 27	1.20
August 2	1.15	December 29	1.30

Caddo, 32 to 34.9 Degrees.

January 1	$1.05	August 8	$1.00
January 25	1.10	August 14	.90
January 28	1.15	August 17	.80
March 8	1.25	August 29	.75
March 15	1.30	December 2	.85
March 27	1.40	December 14	.95
July 25	1.30	December 19	1.05
August 1	1.20	December 27	1.15
August 2	1.10	December 29	1.25

Caddo, Heavy.

January 1	$0.80	July 25	$0.70
January 25	.85	July 29	.65
January 28	.80	December 14	.75
July 16	.80	December 27	.85

De Soto, Light.

January 1	$1.10	August 8	$1.05
January 25	1.15	August 14	.95
January 28	1.20	August 17	.85
March 8	1.30	August 29	.80
March 15	1.35	December 2	.90
March 27	1.45	December 14	1.00
July 25	1.35	December 19	1.10
August 1	1.25	December 27	1.20
August 2	1.15	December 29	1.30

Crichton.

January 1	$0.85	July 29	$0.65
January 25	.90	August 29	.60
January 28	.95	December 4	.70
March 8	1.00	December 14	.80
March 15	1.05	December 19	.90
June 15	.90	December 27	1.00
June 24	.80	December 29	1.10
July 15	.70		

Corsicana Light, Electra, Henrietta.

January 1	$1.20	August 7	$1.15
January 21	1.25	August 14	1.05
January 27	1.30	August 16	.95
March 6	1.40	August 26	.90
March 11	1.45	November 30	1.00
March 14	1.55	December 12	1.10
July 25	1.45	December 19	1.20
July 29	1.35	December 23	1.30
August 2	1.25	December 29	1.40

Corsicana Heavy.

January 1	$0.60	August 14	$0.45
January 7	.65	August 16	.40
January 21	.70	November 30	.45
January 27	.75	December 13	.50
March 13	.80	December 19	.60
July 25	.70	December 23	.70
July 31	.60	December 29	.75
August 7	.50		

Thrall, Strawn and Moran.

January 1	$1.05	August 7	$1.15
January 27	1.30	August 16	.95
March 6	1.40	August 26	.90
March 13	1.45	November 30	1.00
March 15	1.55	December 13	1.10
July 25	1.45	December 18	1.20
July 31	1.35	December 19	1.30
August 1	1.25	December 29	1.40

Canada.

January 1	$1.73	July 28	$2.03
January 5	1.83	August 1	1.98
January 22	1.88	August 3	1.88
January 27	1.93	August 14	1.83
February 16	1.98	November 18	1.88
March 7	2.03	December 13	1.93
March 16	2.13	December 19	1.98

Batson.

January	$0.60	July	$0.70
	.70	December	.75
	.80		.80
February	.80		.90
July	.80		1.00
	.75		

Goose Creek.

January	$0.60	December	$0.75
	.65		.80
February	.65		.90
July	.65		1.00

Humble.

January	$0.60	July	$0.70
	.70	December	.75
	.80		.80
February	.80		.90
July	.80		1.00
	.75		

Dayton.

January	$0.70	December	$0.80
July	.65		.90
December	.75		1.00

Saratoga.

January	$0.60	July	$0.65
	.70	December	.75
	.80		.80
July	.80		.90
	.70		1.00

Sour Lake.

January	$0.60	July	$0.65
	.70	December	.75
	.80		.80
July	.80		.90
	.70		1.00

Spindletop.

January	$0.65	December	$0.80
	.75		.85
	.85		.95
July	.75		1.05
	.70		

Edgerly.

January	$0.50	July	$0.60
	.60	December	.70
	.70		.85
July	.65		1.06

Jennings.

January	$0.60	December	$0.75
	.70		.80
	.80		.90
July	.70		1.00
	.65		

Vinton.

January	$0.60	December	$0.75
	.70		.80
	.80		.90
July	.70		1.00
	.65		

***Markham.**

January	$0.60	July	$0.65
	.70	December	.75

* Posted by the Texas Company.

Local Market Quotations on Gasoline and the Naphthas.

The record of the year in the gasoline and the naphtha market locally is one of many prophecies of high prices wihtout fulfillment and of a long steady quotation for months prior to the close of the season when crude oil was advancing and the cry of underproduction was raised on every hand. Scarcely a week went by from September till January 1 without the statement from some one in the market—and in many cases some one who ordinarily would be expected to know what was in the air—that gasoline and the naphthas were booked for an immediate raise. Prices in other sections of the country indulged in a financial seesaw, and space would forbid a detailed statement of the changes in the several larger distributing sections, yet the New York—and this means Eastern and New England—quotations remained as a whole virtually in status quo.

This does not mean, however, that there was no change, for there was. The year opened with the spot price for gasoline at 21c. a gallon to garages and at 23c. to consumers, with predictions that a quick change would send up the prices until "40c. gasoline was a probability and not a possibility."

There was a reason for this, for the scarcity of the crude petroleum was a condition and not a theory, and refineries who had accepted orders for future delivery in numerous instances were hard put to get the oil to supply their orders. This meant premiums over existing quotations, and the premiums were paid.

From January 3 the market was somewhat involved with garage and consumer prices ranging from 5 to 6c. higher than the quotation, but with garage orders being booked at lower prices. But early in August the quotations had eased off so that 22c. a gallon to garages and 24c. to consumers were the general quotation and there was no quotable change from that time until the end of the year, although the market was firmer in December than it had been for months previous owing to the high prices obtained for crude oil in the fields, with Pennsylvania at a record point.

The gasoline price record bore a close resemblance to that for the naphthas and both were influenced by the same demands. The rapid increase in the number of automobiles, the huge export demand, the call for use in stationary engines and tractors sent prices of the naphthas up from the early part of January so that the quotations at the close of the year ranged appreciably higher as will be seen by the table herewith. On January 5 prices on all the naphthas, jobbing quotations, were raised 1c. Motor gasoline was lifted a cent on February 7, and all quotations were increased 1c. on March 2. This was followed, however, on August 7 by the reduction of 1c. a gallon on motor gasoline and varnish makers and painters' deodorized naphtha, and by a similar reduction of September 7. From that time no change was quoted, and the year ended as it had begun with prophecies of immediate changes upward owing to crude scarcity and excessive demands.

The comparative prices on the gasoline and naphtha groups, domestically in New York city, on December 31, 1915, and December 31, 1916, were as follows:—

	Dec. 31, 1916.	Dec. 31, 1915.
Motor gasoline (garages), steel barrels	22.00	21.00
Motor gasoline to consumers	24.00	23.00
Naphtha, varnish makers and painters, deodorized, steel barrels	22.00	20.00
Wooden barrels	24.00	23.00
Gasoline machine	30.00	34.00
73@76 deg., steel barrels	31.00	29.00
73@76 deg., wooden barrels	34.00	32.00
70@72 deg., steel barrels	29.00	27.00
70@72 deg., wooden barrels	32.00	30.00
68@70 deg., steel barrels	28.00	26.00
68@70 deg., wooden barrels	31.00	29.00

The following table of comparisons shows the high and low for gasoline in the New York market for the last five years:—

	High. Cents.	Low. Cents.
1916	24	21
1915	21	12
1914	16	13
1913	17	16
1912	16	9
1911	11	9

Price Changes in Lubricating Oils.

The year's changes in the lubricating oil market are shown by the following comparison of opening and closing prices:—

	Opening.	Closing.
Black—reduced, 29 gravity, 25@30 cold test	12½@13	13½@14
29 gravity, 15 cold test	13 @14	14 @15
summer	12 @13	13 @14
Cylinder—light filtered	20 @25	21 @26
dark filtered	17 @18	18 @19
extra cold test	25 @30	26 @31
dark steam refined	14 @16	15 @19
Natural West Virginia—29 gravity	24½@25	26½@27
filtered lemon: 37½@38 gravity	19½@20	21½@22
gravity	19½@20	21½@22
32@34 gravity, bloomless	19½@20	21½@22
31 gravity, wool grade	17½@18	19½@20
Paraffine—high viscosity	24½@25	29½@30
903 specific gravity	16½@17	21½@22
895 specific gravity	13½@14	18½@19
red paraffine	13 @14	18 @19
Spindle—No. 200	19½@20	24 @25
No. 160	18½@19	23½@24
No. 110	18 @18½	23 @23½
No. 80	16 @17	21 @22
filtered	23 @24	28 @35

Exports for the Year 1916.

The year 1916 was one of the most prosperous and unusual in the point of export totals yet recorded. The situation was governed during the entire 12 months by the law of supply and demand, as modified by the ability to secure transportation facilities, for freight rates soared to a point little dreamed of even by the most pessimistic at the close of the previous year, and the resulting demand in the Far East was of necessity modified by the increased distribution prices there, due to the added cost made necessary by the high freight rates, when bottoms could be obtained for the transportation of American mineral oils and refined products.

Scarcity of Carriers.

Despite the fact that the tanker fleet has been materially increased during the year, and that many new tank oil-carriers are now on the stocks being rapidly rushed to completion, there has been such a scarcity of carriers that the tankers could not begin to take care of the amounts of oil awaiting shipment. Case oil, gasoline and the naphthas were in such demand—not to speak of lubricating and motor fuels—that freight rates rose to an unprecedented point, when bottoms could be obtained, and the case freight rates to the Far East, Australia and New Zealand reached such levels that any available carrier was engaged with the result that owing to the scarcity of steamers sailing vessels were employed. Towards the close of the year even these became unavailable in anything like sufficient numbers, with the result that premiums were paid generally over the nominal offered rates.

The result of all this was new high levels on rates. Early in the year as much as $1.60 was paid on case oil to the Far East; this being followed by still further increases to $1.85 and $3 a case. Up to $8 a barrel was paid sailing vessels between New York and the United Kingdom, but toward the end of year prices eased off owing to less stringent demand, and rates to Far Eastern, New Zealand and Australian ports were quoted toward the close of the year at 20 cents or so less than the high previously ruling.

Petroleum Clearances.

The total clearances of petroleumn for the year from the port of New York aggregated approximately 7[illegible]000,000 gallons. The figures as compiled give the following totals:—

	1916.	1915.
Refined	430,171,265	411,500,250
Crude	8,395,736	10,500,000
Naphtha	105,750,716	149,615,890
Benzine	2,318,843	6,600,000
Gasoline	26,029,196	23,650,000
Lucricating oils	151,052,974	136,760,400
Totals	724,718,131	738,626,540

Total clearances of petroleum at Philadelphia for 1916 aggregated 227,420,979 gallons, as against 148,032,028 gallons for 1915, an increase of 79,388,951 gallons.

Fuel and gas oil exports from New York for 1916 were 99,900,700 gallons, a decrease of 16,599,300 gallons, compared with 1915.

Export Price Ranges in Gasoline and Naphthas.

This year's high and low prices for gasoline and the naphthas for export were as follows:—

Opening Quotations.

GASOLINE, NAPHTHAS, ETC.

	10-gallon drums. Under 100 cases.	100 cases and over.
Benzine, 59@62 deg.	30¼	29¾
Gasoline, stove	31½	31
Naphthas—		
Auto, 68@72 deg.	34	33¼
73@76 deg.	38	37½

	In cans and cases— Under 100.	100-199.	200-299.
Benzine, 59@62 deg.	25¼	25	24¾
Gasoline, stove	26½	26¼	26
Naphthas—			
Auto, 68@72 deg.	29	28¾	28¼
73@76 deg.	33	32¾	32½

Closing Quotations.

NAPHTHAS, GASOLINE, ETC.

	10-gallon drums. Under 100 cases.	100 cases and over.
Benzine, 59@62 deg.	34¼	33¾
Gasoline, stove	34½	34
Naphthas—		
Auto, 68@72 deg.	38	37½
73@76 deg.	42	41½

	In cans and cases. Under 100.	100-199.
Benzine, 59@62 deg.	29½	29¼
Gasoline, stove	29¾	29½
Naphthas—		
Auto, 68@72 deg.	33¼	33
73@76 deg.	37¼	37

	200-299.
Benzine, 59@62 deg.	29
Gasoline, stove	29¼
Naphthas—	
Auto, 68@72 deg.	32¾
73@76 deg.	36¾

All grades of naphthas were advanced 2c. January 14, with the exception of stove gasoline, which was marked up 1c. All quotations for the naphthas were advanced 1c. February 5 and 25 and ¼c. June 1. All quotations for naphthas reduced 1c. August 11. All quotations for naphthas and gasoline in cases advanced 1c. December 23.

Price Changes in Illuminating Oils.

The price changes in the export quotations for illuminating oils with four years' high and low prices follow:—

	Cents per gallon— Bulk.	Barrels.	Cases.
January 1	5.00	8.05	10.75
January 4	5.25	8.05	11.00
January 15	5.25	8.95	11.25
March 31	5.25	8.95	11.25
June 1	5.25	8.95	11.50
August 4	5.25	9.10	11.50
August 11	5.10	8.95	11.35
August 14	5.00	8.85	11.25
September 5	4.75	8.60	11.00
September 12	4.50	8.35	10.75
December 6	4.50	8.65	10.75
December 22	4.50	8.65	11.75
1916, high	5.25	9.10	11.50
low	4.50	8.35	10.75
1915, high	5.00	8.75	11.25
low	4.10	7.50	9.75
1914, high	5.25	8.75	11.25
low	4.75	8.25	10.75

Total Exports Mineral Oils 1915 and 1916.

The exports of mineral oils, by months, since the first of January, 1916, and the comparative figures for the previous year, by classifications, will be found herewith:—

Crude.

	1916. Gallons.	1915. Gallons.
January	14,969,087	13,529,802
February	13,827,080	9,112,599
March	11,593,959	14,140,818
April	14,811,620	8,883,482
May	13,102,514	11,821,211
June	15,999,018	21,361,650
July	10,533,948	11,755,109
August	17,994,796	15,630,236
September	15,430,766	15,149,879
October	14,620,785	12,518,427
November	14,216,933	13,594,958
December	14,947,082	10,784,798

Exports Three Years.

1916	172,029,903
1915	158,263,009
1914	124,735,553
1913	194,569,634

Gas and Fuel Oil.

	1916. Gallons.	1915. Gallons.
January	56,232,785	45,970,213
February	71,214,590	54,873,471
March	73,193,011	40,522,505
April	54,065,947	53,132,192
May	87,776,024	69,486,774
June	69,783,184	56,315,948
July	90,049,882	71,532,643
August	90,756,572	81,609,878
September	98,823,597	91,726,855
October	90,629,255	86,332,379
November	92,409,868	72,270,888
December	83,583,932	81,095,304

Exports Three Years.

1916	967,518,417
1915	799,589,047
1914	574,298,844
1913	359,008,618

Gasoline.

	1916. Gallons.	1915. Gallons.
January	5,939,384	7,957,900
February	3,806,092	17,292,897
March	9,787,987	16,435,783
April	9,781,561	10,071,792
May	12,249,661	9,223,970
June	17,703,856	10,770,496
July	21,774,610	7,256,917
August	25,590,533	8,279,278
September	15,203,115	4,612,832
October	13,309,695	6,642,046
November	16,991,773	10,089,254
December	13,770,049	4,019,755

Exports Three Years.

1916	167,928,262
1915	112,562,929
1914	162,666,038
1913	359,008,618

Illuminating Oil.

	1916. Gallons.	1915. Gallons.
January	62,424,837	58,306,568
February	57,956,070	54,089,523
March	83,730,397	71,875,525
April	60,132,433	58,532,778
May	73,988,054	92,822,467
June	75,188,653	81,778,953
July	72,260,652	79,208,323
August	74,328,094	80,334,711
September	90,125,623	68,425,038
October	79,414,772	70,657,867
November	56,555,053	55,552,005
December	78,121,092	65,381,207

Exports Three Years.

1916	854,403,813
1915	836,968,665
1914	1,010,449,253
1913	1,119,441,243

Lubricating and Heavy Paraffin.

	1916. Gallons.	1915. Gallons.
January	19,583,401	16,916,907
February	18,958,167	11,830,287
March	18,894,751	17,398,506
April	18,395,454	25,900,106
May	25,688,165	22,616,397
June	27,212,148	23,261,204
July	25,877,763	24,908,132
August	27,593,849	22,983,944
September	23,814,966	18,672,716
October	19,675,957	18,193,621
November	18,652,772	18,744,561
December	16,520,289	18,282,306

Exports Three Years.

1916	260,779,127
1915	239,678,726
1914	191,647,570
1913	207,839,092

Naphthas and Light Products.

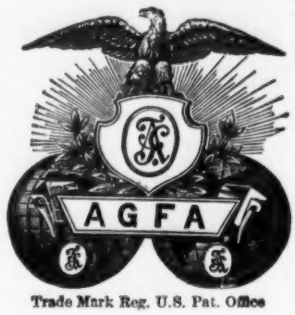
	1916. Gallons.	1915. Gallons.
January	11,190,588	5,666,700
February	13,931,507	6,053,804
March	19,856,303	5,509,158
April	10,073,274	14,187,422
May	18,507,272	16,094,600
June	17,234,769	17,602,424
July	24,295,236	17,032,778
August	16,751,441	22,298,263
September	23,124,660	16,422,328
October	16,601,794	11,867,595
November	6,831,239	17,355,256
December	9,996,273	18,875,815

Berlin Aniline Works

213-215 Water Street - - New York

BOSTON

CHARLOTTE, N. C.



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Dyestuffs Chemicals

American Alkali & Acid Company

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Oxalic Acid	Lactic Acid
Potassium Bin Oxalate	Sulphuric Acid
Potassium Oxalate	Hydrated Potassium Carbonate
Ammonium Bin Oxalate	Calcined Potassium Carbonate
Ammonium Oxalate	Crude Calcium Carbonate
Sodium Oxalate	Crude Calcium Sulphate

Inquiries for Prices and Deliveries Solicited

PETROLEUM MARKETED IN THE UNITED STATES, 1859-1915 (in 42-Gal. Bbls.).

Year.	Pennsylvania and New York.	Ohio.	West Virginia.	California.	Kentucky and Tennessee.	Colorado.	Indiana.	Illinois.	Kansas.	Texas.	Missouri.	Oklahoma.	Wyoming.	Louisiana.	United States.	Total value.	Year.
	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.	Barrels.		
1859	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000	$32,000	1859
1860	500,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500,000	4,800,000	1860
1861	2,113,609	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,113,609	1,035,668	1861
1862	3,056,690	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,056,690	3,209,525	1862
1863	2,611,309	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,611,309	8,225,663	1863
1864	2,116,109	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,116,109	20,896,576	1864
1865	2,497,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,497,700	16,459,853	1865
1866	3,597,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,597,700	13,455,398	1866
1867	3,347,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,347,300	8,066,933	1867
1868	3,646,117	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,646,117	13,217,174	1868
1869	4,215,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,215,000	23,730,450	1869
1870	5,260,745	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,260,745	20,503,754	1870
1871	5,205,234	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,205,234	22,591,180	1871
1872	6,293,194	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,293,194	21,440,503	1872
1873	9,893,786	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,893,786	18,100,464	1873
1874	10,926,945	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,926,945	12,647,527	1874
1875	8,787,514	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,787,514	7,368,133	1875
1876	8,968,906	31,763	120,000	12,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,132,669	22,982,822	1876
1877	13,135,475	29,888	172,000	13,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13,350,363	31,788,566	1877
1878	15,163,462	38,179	180,000	15,227	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,396,868	18,044,520	1878
1879	19,685,176	29,112	180,000	19,858	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19,914,146	17,210,708	1879
1880	26,027,631	38,940	179,000	40,552	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26,286,123	24,600,638	1880
1881	27,376,509	33,867	151,000	99,862	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27,661,238	25,448,339	1881
1882	30,053,500	39,761	128,000	128,636	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,349,897	23,631,165	1882
1883	23,128,380	47,632	126,000	142,857	4,755	.....	.....	.....	.....	.....	.....	.....	.....	.....	23,449,633	25,790,252	1883
1884	23,772,209	90,081	90,000	262,000	4,148	.....	.....	.....	.....	.....	.....	.....	.....	.....	24,218,438	20,595,966	1884
1885	20,776,041	661,580	91,000	325,000	5,164	.....	.....	.....	.....	.....	.....	.....	.....	.....	21,858,785	19,198,243	1885
1886	25,798,000	1,782,970	102,000	377,145	3,726	.....	.....	.....	.....	.....	.....	.....	.....	.....	28,064,841	19,996,313	1886
1887	22,356,193	5,022,632	145,000	678,572	4,791	76,295	.....	.....	.....	.....	.....	.....	.....	.....	28,283,483	18,877,094	1887
1888	16,488,668	10,010,868	119,448	690,333	5,096	297,612	.....	.....	.....	.....	.....	.....	.....	.....	27,612,025	17,947,620	1888
1889	21,487,435	12,471,466	544,113	803,220	5,400	316,476	33,375	1,460	500	48	20	.....	.....	.....	35,163,513	26,963,340	1889
1890	28,458,208	16,124,656	492,578	807,360	6,000	368,842	63,496	900	1,200	54	278	.....	.....	.....	45,823,572	35,365,105	1890
1891	33,009,236	17,740,301	2,406,218	323,600	9,000	665,482	136,634	675	1,400	54	25	30	.....	.....	54,292,655	30,526,553	1891
1892	28,422,377	16,362,921	3,810,086	385,049	6,700	824,000	698,068	521	5,000	45	10	80	.....	.....	50,514,657	25,906,463	1892
1893	20,314,513	16,249,769	8,445,412	470,179	3,000	594,390	2,335,293	400	18,000	50	50	10	.....	.....	48,431,066	28,950,226	1893
1894	19,019,990	16,792,154	8,577,624	705,969	1,500	515,746	3,688,666	300	40,000	60	8	130	2,369	.....	49,344,516	35,522,095	1894
1895	19,144,390	19,545,233	8,120,125	1,208,482	1,500	438,232	4,386,132	200	44,430	50	10	37	3,455	.....	52,892,276	57,632,296	1895
1896	20,584,421	23,941,169	10,019,770	1,252,777	1,680	361,450	4,680,732	250	113,571	1,450	43	170	2,878	.....	60,960,361	58,518,709	1896
1897	19,262,066	21,560,515	13,090,045	1,903,411	322	384,934	4,122,356	500	81,098	65,975	19	625	3,650	.....	60,475,516	40,874,072	1897
1898	15,948,464	18,738,708	13,615,101	2,257,207	5,568	444,383	3,730,907	360	71,980	546,070	10	.....	5,475	.....	55,364,233	44,193,359	1898
1899	14,374,512	21,142,108	13,910,630	2,642,095	18,280	390,278	3,848,182	350	69,700	669,013	132	.....	5,560	.....	57,070,950	64,605,904	1899
1900	14,559,127	22,362,730	16,195,675	4,324,484	62,259	317,385	4,874,392	200	74,714	836,039	a 1,602	6,472	5,450	.....	63,620,529	75,989,313	1900
1901	13,831,996	21,648,083	14,177,126	8,786,330	137,259	460,520	5,757,086	250	179,151	4,393,658	a 2,335	10,000	5,400	.....	69,389,194	66,417,335	1901
1902	13,183,610	21,014,231	13,513,345	13,984,268	185,331	396,901	7,480,896	200	331,749	18,083,658	a 757	37,100	6,253	548,617	88,766,916	71,178,910	1902
1903	12,518,134	20,480,286	12,899,395	24,382,472	554,286	483,925	9,186,411	.....	932,214	17,955,572	a 3,000	138,911	8,960	917,771	100,461,337	94,694,050	1903
1904	12,239,026	18,876,631	12,644,686	29,649,434	998,284	501,763	11,339,124	.....	4,250,779	22,241,413	a 2,572	1,366,748	11,542	2,958,958	117,080,960	101,175,455	1904
1905	11,554,777	16,346,660	11,578,110	33,427,473	1,217,337	376,238	10,964,247	181,084	b12,013,495	28,136,189	a 3,100	(c)	8,454	8,910,416	134,717,580	84,157,390	1905
1906	11,500,410	14,787,763	10,120,935	33,098,598	1,213,548	327,582	7,673,477	4,367,050	b21,718,648	12,567,897	a 3,500	(c)	d 7,000	9,077,528	126,493,936	92,444,735	1906
1907	11,211,606	12,207,448	9,095,296	39,748,375	820,844	331,851	5,128,037	24,281,973	2,409,521	12,322,696	a 4,000	43,524,128	c 9,339	5,000,221	166,095,335	120,106,749	1907
1908	10,584,453	10,858,797	9,523,176	44,854,737	f 727,767	379,653	3,283,639	33,696,238	1,801,781	11,206,464	a 15,246	45,798,765	c 17,775	5,788,874	178,527,355	129,079,184	1908
1909	10,434,300	10,632,793	10,745,092	55,471,601	f 639,016	310,861	2,296,086	30,898,333	1,263,764	9,534,467	a 5,750	47,859,218	c 20,056	3,059,531	183,170,874	128,328,487	1909
1910	9,848,500	9,916,370	11,753,071	73,010,560	f 468,774	239,794	2,159,725	33,143,362	1,128,668	8,899,266	a 3,615	52,028,718	c 115,430	6,841,395	209,557,248	127,899,688	1910
1911	9,200,673	8,817,112	9,795,464	81,134,391	f 472,458	226,926	1,695,289	31,317,038	1,278,819	9,526,474	a 7,995	56,069,637	c 186,695	10,720,420	220,449,391	134,044,752	1911
1912	8,712,078	a 8,969,007	12,128,962	g87,272,593	f 484,368	206,052	970,009	28,601,308	1,592,796	11,735,057	(h)	51,427,071	1,572,306	9,263,439	222,935,044	164,213,247	1912
1913	8,865,493	8,781,468	11,567,299	97,788,525	f 524,568	188,799	956,095	23,893,899	2,375,029	15,009,478	i 10,843	63,579,384	2,406,522	12,498,828	248,446,230	237,121,388	1913
1914	9,109,309	8,536,352	9,680,033	99,775,327	f 502,441	222,773	1,335,456	21,919,749	3,103,585	20,068,184	j 7,792	73,631,724	3,560,375	14,309,435	265,762,535	214,125,215	1914
1915	8,736,483	7,825,326	9,264,798	86,591,535	f 437,274	208,475	875,758	19,041,695	2,823,487	24,942,701	j 14,265	97,915,243	4,245,525	18,191,539	281,104,104	179,462,990	1915
	762,906,696	440,587,330	269,497,613	827,865,094	9,533,244	10,857,618	103,699,558	251,368,311	57,725,079	228,742,082	86,977	533,394,201	12,210,469	108,086,972	3,616,561,244	2,971,388,126	

a Includes the production of Michigan.
b Includes the production of Oklahoma.
c Included with Kansas.
d Estimated.
e Includes production of Utah.
f No production in Tennessee recorded.
g Includes small production of Alaska.
h No production in Missouri; Michigan included in Ohio.
i Includes production of Alaska, Michigan, and New Mexico.
j Includes production of Alaska and Michigan.

Exports Three Years.

1916	188,288,863
1915	169,046,052
1914	47,023,617
1913	70,315,093

Residuum.

	1916. Gallons.	1915. Gallons.
January	2,791,014	25,228
February	215,929	45,066
March	2,976,406	2,424,507
April	178,927	183,528
May	62,693	2,345,146
June	114,711	389,058
July	43,822	5,624,254
August	24,076	428,091
September	58,094	614,009
October	74,686	101,094
November	29,480	285,050
December	.....	.....

Exports Three Years.

1916	6,543,324
1915	12,627,162
1914	69,209,777
1913	67,863,755

Total Refined.

	1916. Gallons.	1915. Gallons.
January	158,162,009	134,842,714
February	165,982,356	143,884,998
March	208,438,805	164,255,983
April	142,629,596	162,007,817
May	218,271,874	206,590,354
June	207,237,558	190,117,693
July	245,310,995	205,628,047
August	235,044,565	217,814,165
September	231,149,865	200,473,778
October	209,606,159	192,804,599
November	191,470,185	174,277,014
December	177,521,055	187,816,518

Exports Three Years.

1916	2,449,228,140
1915	2,171,312,548
1914	2,115,298,090
1913	1,941,996,087

Total Mineral Oils.

	1916. Gallons.	1915. Gallons.
January	173,131,096	148,372,606
February	179,809,436	152,997,597
March	220,031,864	168,396,821
April	157,441,216	170,871,209
May	231,374,388	218,420,565
June	223,236,606	211,479,373
July	255,844,913	217,383,156
August	253,039,361	233,444,401
September	266,580,631	215,623,617
October	224,226,894	205,323,026
November	205,687,118	187,871,972
December	192,468,137	198,601,316

Total Exports Three Years.

1916.	Total gallons	2,607,491,209
	Value	$201,732,563
1915.	Total gallons	2,329,575,617
	Value	$142,972,322
1914.	Total gallons	2,240,033,652
	Value	$133,990,587
1913.	Total gallons	2,136,563,721
	Value	$149,316,409

Situation in Foreign Markets.

For the first time in many years there was a decrease in the receipts of petroleum and its products by the United Kingdom from the United States, but it must be taken into consideration in this connection that there was a decided decrease in the amount of such materials received by the United Kingdom during the year just closed—a decrease, in fact, amounting in all to approximately 23,000,000 gallons. This was not as large as it might have been, all the exigencies of the war being taken into consideration, seeing Galicia, Roumania, Russia and Persia did not begin to figure as usual in the exportation of petroleum products to Great Britain. It is interesting to note, however, that despite the decrease to 1916 there was still a healthy increase over previous years.

The imports from the United States by classifications for the year were as follows:—

United States to Great Britain, 1916.

	Gallons.
Illuminating	114,503,854
Lubricating	77,601,336
Gas oil	53,329,983
Benzine	78,709,803
Fuel oil	11,888,819
Other classifications	1,523,720
Total, mineral oils	336,529,970

The total mineral oil receipts from other countries was as follows:—

Canada, 19,760; Dutch Indies, 73,450,031; Mexico, 40,627,038; other countries, not including Belgium, Germany, Holland, Roumania and Russia, which ordinarily were important sources of supply, 2,158,472 gallons; or a total from all sources of 452,785,271 gallons.

It is interesting to note in this connection that the British imports of motor spirit—under all classifications—in 1916 approximated 165,000,000 gallons as against approximately 146,000,000 gallons during 1915.

Prices of American Oils Abroad.

The prices for American illuminating oils for spot supplies ruled nominal in the majority of the foreign markets during the year. In London and Liverpool there was no change from last year's final until early in March, which was followed by another change in June. This price was maintained until just after the first of 1917, when another uplift was registered. The following table gives the high and low prices on American illuminating oil, standard white, in London and in Liverpool in pence per gallon, by months:—

London and Liverpool Prices.

	London—Pence.		Liverpool—Pence.	
	High.	Low.	High.	Low.
January	9¾	9¾	10	10
February	9¾	9¾	10	10
March	10	9¾	10¼	10
April	10	10	10¼	10¼
May	11¼	10	11	10¼
June	13¼	10	13½	10¼
July	13¼	13¼	13½	13½
August	13¼	13¼	13½	13½
September	13¼	13¼	13½	13½
October	13¼	13¼	13½	13½
November	13¼	13¼	13½	13½
December	13¼	13¼	13½	13½

KENTUCKY AND TENNESSEE MAY LEAD ALL EASTERN FIELDS AT THE CLOSE OF 1917

10,204 Wells Completed in 1916, of Which 7,246 Were Oil Producers—Average Production Per Day Was 15 1-7 Barrels—Oil Higher Than for Years.

In the high grade petroleum fields east of the Mississippi River, comprising Southern New York, Pennsylvania, West Virginia, Southeastern, Central and Northwestern Ohio, Indiana, Illinois, Kentucky and Tennessee, for the year 1916, show a rather active year, due to the good prices that were maintained for the crude petroleum at the wells, and the great demand over the world for gasoline, and the coming summer will experience a much greater demand for the motor gas and oils. The high price of oil well material no doubt has caused the slackness of operations in fields where small wells are found, to a certain extent, but the oil man is usually game, and when they can see a strip of territory that will even show a smell of oil, they never figure what it will cost to get it out, but go right ahead. No doubt the leading section of the high grade field during the new year will be in Kentucky and Tennessee, where vast blocks of acreage has been gathered together by not only the operator of small means, but the large corporations as well, and most of the land being secured by practical men, mean that a large amount of development work will be done as soon as the weather conditions will permit the moving of material onto hundreds of locations that have already been staked out. Oil at the wells is bringing a much larger price than for many years indicating that the refiners expect a record season in the industry.

The wells finished for the year in the various fields constituting the high grade petroleum fields are as follows:—

Field.	Comp.	Prod.	Gas.	Dry.
Pennsylvania	3,049	10,774	254	305
West Virginia	1,795	24,450	432	296
Illinois	1,459	24,713	36	317
Southeastern Ohio	1,375	9,582	76	411
Kentucky	1,071	26,973	16	179
Northwestern Ohio	699	9,301	10	60
Central Ohio	469	1,045	322	111
Indiana	267	3,554	8	98
Tennessee	20	45	..	18
Totals	10,204	110,437	1,154	1,804

The above figures show that there were 7,246 of the wells that are oil-producing wells, and the average production per well per day is about 15 1-7 barrels, a neat average for such a vast amount of finished wells, when it is known that a large majority of them were drilled in supposed light producing territory.

PENNSYLVANIA FIELDS.

The Pennsylvania-Southern New York field for 1916 proved to show more finished wells for the year than any other States in the high grade section, as the total was 3,049, while Ohio was a close second with 2,543, which represents the development of Southeastern, Central and Northwestern Ohio. The feature of the year was the development of some very productive wells in Allegheny, Washington and Greene counties, the Dorseyville section of Allegheny county being in the lead at the start of 1916. The wells for the year in Pennsylvania were distributed by months as follows:—

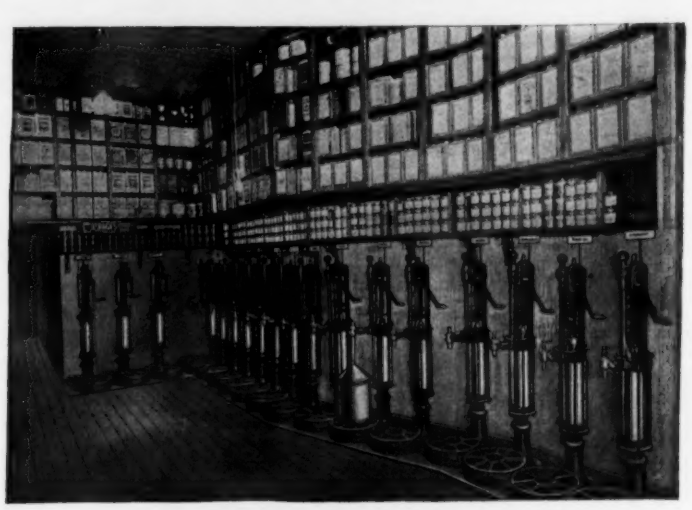
Month.	Comp.	Prod.	Gas.	Dry.
January	178	843	14	21
February	183	1,434	11	23
March	154	346	16	25
April	213	924	21	28
May	295	635	30	25
June	323	756	21	34
July	341	779	21	28
August	304	734	25	31
September	271	578	19	21
October	279	946	33	14
November	248	510	23	19
December	260	2,289	20	36
Totals	3,049	10,774	254	305
For 1915	1,879	9,148	220	277
Difference	1,152	1,626	34	28

The above wells for the year were distributed by each month in each field as follows:—

Clarion-Venango Fields.

Month.	Comp.	Prod.	Gas.	Dry.
January	61	82	2	7
February	84	94	5	9
March	58	100	1	5
April	88	126	8	8
May	106	154	7	10
June	111	153	6	10
July	117	196	5	6
August	100	132	6	5
September	88	124	7	3
October	117	150	11	6
November	71	134	3	4
December	88	117	6	7
Totals	1,109	1,562	67	80
For 1915	590	634	70	64
Difference	519	928	3	16

FIRST FLOOR OUTFITS



CELLAR OUTFITS (Tanks in Cellar)

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ESTABLISHED 1885

WHEN making an important purchase you endeavor to secure the most for the amount expended. Before it is possible for you to be sure of this point, however, it is necessary for you to take into consideration the element of QUALITY.

Back of the name BOWSER stands an unquestioned reputation, not only for highest quality in material and workmanship, but also in service. This exceptional degree of quality insures a profitable investment to those purchasing Paint Oil Storage Systems or oil handling equipment of any kind.

S. F. Bowser & Co., Inc.

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You Can Bump, Bang and Abuse It
But It Stays on the Job!

And that's the kind of barrel to stick to. Leaks are few and far between. Damages and losses, consequently, are not so common, and you save yourself figuring claims on top of transportation costs. A good, reliable steel barrel is the cheapest package after all.

WHITAKER STEEL BARRELS & DRUMS

are built to go the limit and stand a lot of punishment. They can't help making good out in the fields, on the shipping platform, in the jarring boxcars, in the holds of the big ocean tramps. At the end of the trip they are in first class shape and contents are secure.

Regardless of your wants, get in touch with barrel headquarters, where the complete barrel is made from raw steel to the finished container. All sizes, all styles, all finishes.

Whitaker-Glessner Company, Barrel Dept.
Portsmouth Works, Portsmouth, O.

Southwest Pennsylvania.

Month.	Comp.	Prod.	Gas.	Dry.
January	33	561	9	10
February	26	1,138	3	9
March	33	55	12	10
April	35	573	9	11
May	42	147	15	7
June	56	249	8	7
July	92	319	11	13
August	64	310	9	12
September	61	164	6	12
October	57	537	11	5
November	45	159	10	4
December	61	1,870	8	16
Totals	605	6,082	111	116
For 1915	360	2,869	77	103
Difference	245	3,213	34	13

Bradford Field.

Month.	Comp.	Prod.	Gas.	Dry.
January	29	101	..	1
February	36	113	..	2
March	20	86	1	1
April	28	94	1	..
May	58	183	3	1
June	56	170	1	..
July	52	142	..	..
August	52	144	2	1
September	49	152	1	2
October	42	108	2	..
November	45	122	1	..
December	45	173	2	2
Totals	512	1,588	14	10
For 1915	348	952	27	11
Difference	164	636	13	1

Butler-Armstrong Field.

Month.	Comp.	Prod.	Gas.	Dry.
January	26	55	3	2
February	18	52	3	2
March	28	86	2	1
April	31	90	3	9
May	32	73	2	4
June	41	80	5	10
July	26	38	4	5
August	36	57	8	8
September	30	47	5	1
October	16	69	3	3
November	30	36	6	7
December	22	30	2	5
Totals	336	713	46	84
For 1915	323	4,218	16	83
Difference	13	3,505	30	19

Middle Field.

Month.	Comp.	Prod.	Gas.	Dry.
January	23	33	..	1
February	12	22	..	1
March	12	13	..	1
April	13	13	..	1
May	34	48	..	2
June	23	43	1	1
July	29	43	1	2
August	29	46	..	3
September	21	60	..	2
October	26	43	4	..
November	15	22	1	2
December	27	36	1	5
Totals	264	422	8	20
For 1915	178	353	9	14
Difference	86	69	1	6

Allegany Field.

Month.	Comp.	Prod.	Gas.	Dry.
January	6	11	..	..
February	7	15	..	..
March	3	6	..	..
April	18	28	..	..
May	23	30	3	1
June	36	61	..	6
July	25	41	..	2
August	23	45	..	2
September	22	31	..	1
October	21	39	2	..
November	22	37	2	2
December	17	63	1	1
Totals	223	407	8	15
For 1915	98	122	21	2
Difference	125	285	13	13

The above figures show that every district in the Pennsylvania-Southern New York field for the year had a nice increase in the number of finished wells, and with a $3-market staring the trade in the face, it would not be in the least surprising to see a still further advance in the number of wells at the close of 1917.

A few wells in the gusher class from 100 barrels of oil up and some gas wells with a production of 1,000,000 cubic feet a day up were drilled in the Pennsylvania field during the year, and they were confined to the month and county as follows:—

ALLEGHENY COUNTY.

January.

Alex. Walley's No. 1 McCorkle tract, 500 barrels, and No. 2 McFarland heirs tract, 100 barrels.

February.

Alex. Walley No. 4 McCorkle tract, 360 barrels.

National Oil and Gas Company's No. 7 Robinson tract, 700 barrels, and No. 9 same tract, 900 barrels.

March.

Alex. Walley's No. 3 McFarland heirs tract, 150 barrels.

April.

Alex. Walley's No. 3 McCorkle tract, 500 barrels.

Jerry Evans Oil and Gas Company's No. 1 Evans tract, 300 barrels.

Anderson & Walley's No. 1 Bell lot tract, 300 barrels.

October.

People's Gas Company, No. 3 Scott tract, 300 barrels.

Burgettstown Oil and Gas Company, No. 2 S. E. and M. Scott tract, 325 barrels.

BRUSH CREEK FIELD.

January.

Warrendale Oil and Gas Company, No. 2 Hartman tract, 2,000,000 feet of gas.

Lemberg & Co., No. 1 Morrow tract, 1,500,000 feet of gas.

MILLTOWN FIELD.

January.

T. W. Phillips Oil and Gas Company, No. 1 Stottler tract, 2,000,000 feet of gas.

October.

People's Gas Company, Baumgartner tract, 1,500,000 feet of gas.

Philadelphia Gas Company, Hockberg tract, 2,000,000 feet of gas.

MOUNT MORRIS FIELD.

January.

Philadelphia Gas Company, No. 2 Eddy tract, 1,000,000 feet of gas, and No. 2 Kiger tract, 1,500,000 feet of gas.

February.

Philadelphia Gas Company, Moore tract, 1,500,000 feet of gas.

October.

Carnegie Gas Company, Keefer tract, 2,000,000 feet of gas.

South Penn Oil Company, No. 4 Dye tract, 2,500,000 feet of gas.

Philadelphia Gas Company, Cummings tract, 2,000,000 feet of gas.

Manufacturers' Light and Heat Company, Wood tract, 1,500,000 feet of gas.

WASHINGTON COUNTY FIELD.

February.

Carnegie Gas Company, Conger tract, 1,500,000 feet of gas.

August.

Arco Oil and Gas Company, No. 3 J. L. Watson tract, 100 barrels.

October.

Manufacturers' Light and Heat Company, Matthews tract, 2,000,000 feet of gas.

GREENE COUNTY FIELD.

August.

Cochran & Funk, Riggs tract, 125 barrels.

December.

Carnegie Gas Company, No. 1 Insminger tract, 425 barrels, and No. 2, same tract, 1,000 barrels.

WEST VIRGINIA.

The West Virginia petroleum fields were unusually active during 1916, and if things keep agoing as at this time the new year will be the most active in the Little Mountain State in a number of years. There was an exceptionally large gain in finished wells, while the production increase was something unlooked for. Many more gas wells were drilled as well as dry holes. The increase in finished wells totaled 542, and in production the increase amounted to 10,817 barrels. There was an increase in gas wells of 152 and 50 more dry holes. The year shows a total of 1,795 wells finished, 24,450 barrels production, 432 gas wells, and 296 dry holes. The best looking territory left as far as the drill has shown in any section of West Virginia is the Cabin Creek district, in Kanawha county, where the Columbus Producing and other companies have a large acreage yet to develop that is almost certain for wells that will average up well with some of the older fields. With the rapid advance in the price of crude petroleum at the wells and the prospects of a $3-market, may mean that the territory lying idle in the southwestern section of the State, near the Kentucky line, will be more thoroughly tested than at any time since oil was found to exist there. Thousands upon thousands of locations yet remain to be drilled within defined limits of the producing fields over all the producing acreage in the State, and this will be the most active development, for the lease-owners are almost certain of getting some kind of well, while if they are wildcatting they take long chances.

Were it not for the famous West Virginia gas fields the many lines leading out of the State would be unable to secure an ample supply of natural gas for fuel to supply the many cities and towns that now receive a supply for fuel. The field is depended upon by the large gas companies to furnish the supply, as the Pennsylvania and Ohio Gas fields are going backward to a great extent. Extensions to both the oil and gas fields must be looked for somewhere along the West Virginia-Kentucky State line.

Record of Year.

The wells for the year finished by months in the West Virginia fields were as follows:—

Month.	Comp.	Prod.	Gas.	Dry.
January	122	931	28	18
February	128	833	33	11
March	121	922	32	18
April	125	1,362	24	23
May	133	1,461	28	27
June	181	2,631	44	40
July	162	1,965	36	28
August	160	1,060	47	25
September	172	1,903	46	32
October	164	3,678	30	23
November	173	4,466	48	31
December	150	3,238	36	20
Totals	1,795	24,450	432	296
For 1915	1,253	13,633	280	246
Difference	542	10,817	152	50

The above totals for 1916 show that the field was a little more active than during 1914, which was a big year for West Virginia. The figures for 1914 were 1,759 wells finished, 25,229 barrels production, 365 gas wells, and 339 dry holes.

The more important wells are those that produce from 100 barrels and up of oil, or from 1,000,000 cubic feet of natural gas. Natural gas is one of the most important products of West Virginia at this time, as many towns and cities in adjoining States are dependent upon it for fuel and light to a large extent. These wells were by months, county or district, well owner and production, as follows:—

MANNINGTON DISTRICT.

January.

Reserve Gas Company, Nos. 8 and 9 Camden tract, 2,000,000 and 2,500,000 cubic feet of gas.

South Penn Oil Company, Rohrbaugh tract, 2,000,000 cubic feet.

Hope Gas Company, Campbell tract, Shaw tract, McClain tract, Barnes tract, Price heirs' tract, Strothers tract, and Doak tract, 2,000,000, 2,000,000, 1,500,000, 2,000,000, 2,000,000 and 1,500,000 cubic feet, respectively.

Manufacturers' Light and Heat Company, Pliver and Oliver tracts, 1,500,000 cubic feet each.

Philadelphia Gas Company, Boggess tract and Grover tract, 1,500,000 and 2,500,000 cubic feet.

Carnegie Natural Gas Company, Stoneking, Kennedy, Snyder and Reda tract, 3,000,000, 2,000,000, 1,500,000 and 2,000,000 cubic feet.

Pebtess Gas Company, Wright tract, 1,500,000 cubic feet.

Ritchie County.

G. L. Cabot, Rodgers tract, 2,00,000 cubic feet.

R. E. L. Frimire, Keith tract, 1,500,000 cubic feet.

Clay County.

Chalmers Oil and Gas Company, Samples tract, 1,500,000 cubic feet.

Roane County.

United Fuel Gas Company, Reed tract, 2,500,000 cubic feet.

Kanawha County.

Jefferson Oil Company, Shrader tract, 1,500,000 cubic feet.

Columbus Producing Company, Williams Coal Company's tract, 150 barrels oil.

Doddridge County.

Hope Gas Company, Dennison tract, 175 barrels oil.

FEBRUARY.

Mannington District.

Hope Gas Company, Brown, Kerns, Kemper, Barrackman and Hibbs tract, 2,000,000, 2,000,000, 2,000,000, 2,000,000, and 3,000,000 cubic feet.

Grove and Parrish, Allen tract, 1,500,000 cubic feet.

W. Brent Maxwell, Maxwell tract, 3,000,000 cubic feet.

Philadelphia Gas Company, Throckmorton, Carrey and Cather tracts, 3,000,000, 2,000,000 and 1,500,000 cubic feet.

Carnegie Gas Company, Plants, Bradley and Soles tract, 1,500,000, 2,000,000 and 1,500,000 cubic feet.

Fairmont Gas Company, Lemsaters tract, 2,000,000 cubic feet.

Wetzel County.

Hope Gas Company, Allen, Davis and Evans tract, 3,000,000, 2,000,000 and 2,000,000 cubic feet.

Sun Gas Company, Cain heirs' tract, 1,500,000 cubic feet.

Wildwood Oil Company, Morgan tract, 200 barrels oil.

Marshall County.

Cameron Light and Heat Company, Davis tract, 2,000,000 cubic feet.

Manufacturers' Light and Heat Company, Bowers tract, 2,000,000 cubic feet.

United Fuel Gas Company, Ledkins tract, 2,500,000 cubic feet.

Lincoln County.

Charleston-Dunbar Gas Company, Russell tract, 3,000,000 cubic feet.

Four-Mile Oil Company, Guyandotte tract, 2,000,000 cubic feet.

Wayland Oil and Gas Company, Pauley tract, 2,000,000 cubic feet.

Ritchie County.

Imperial Oil and Gas Products Company, W. C. Keith tract, 150 barrels.

Roane County.

United Fuel Gas Company, Walker tract, 300 barrels.

MARCH.

Mannington District.

Reserve Gas Company, Paugh tract, 2,000,000 cubic feet.

South Penn Oil Company, Rhode and Hayhurst tracts, 3,000,000 and 1,500,000 cubic feet.

Philadelphia Gas Company, Earnshaw tract, 2,000,000 cubic feet.

Pittsburgh-West Virginia Gas Company, Moore tract, 2,500,000 cubic feet.

Carnegie Gas Company, Snyder, Fox and Jonnson tracts, 2,000,000, 1,500,000 and 3,000,000 cubic feet.

Hope Gas Company, Jarvis, Barrett and Foley tracts, 3,000,000, 2,000,000 and 1,500,000 cubic feet.

J. H. McDermott, Price heirs' and Tennant tracts, 2,000,000 and 4,000,000 cubic feet.

Hope Gas Company, Stalnaker heirs and Griffin tracts, 2,000,000 and 1,500,000 cubic feet.

Wetzel County.

Reno Oil ompany, Haught tract, 2,000,000 cubic feet.

Manufacturers' Light and Heat Company, Murray tract, 2,000,000 cubic feet.

Hope Gas Company, Terrell tract, 2,000,000 cubic feet.

Barber & Co., Haddox tract, 1,500,000 cubic feet.

Pittsburgh-West Virginia Gas Company, Ford-Kenney tract, 2,000,000 cubic feet.

Ritchie County.

Imperial Oil and Gas Products Company, No. 2 Keith tract, 160 barrels.

Hope Gas Company, Schupp and Miller heirs' tracts, 1,500,000 cubic feet each.

Kanawha County.

Columbus Producing Company, No. 20 Williams Coal Company's tract, 100 barrels.

United Fuel Gas Company, Ross and Perry tracts, 2,000,000 cubic feet each.

Columbus Producing Company, Nos. 13 and 17 Williams Coal tract, 100 and 150 barrels.

Lincoln County.

Wayland Oil and Gas Company, No. 2 Pauley tract, 3,000,000 cubic feet.

Roane County.

United Fuel Gas Company, Dye tract, 2,000,000 cubic feet.

Marshall County.

Manufacturers' Light and Heat Company, Hicks tract, 1,500,000 cubic feet.

Doddridge County.

Hope Gas Company, No. 11 Stalnaker heirs' tract, 115 barrels.

APRIL.

Mannington District.

Hope Gas Company, Curry, Chandler, Morris, Foley, Tennett and Gump tracts, 3,000,000, 2,000,000, 4,000,000, 2,000,000, 4,000,000 and 2,000,000 cubic feet.

Hartzel-Wilson Company, White tract, 2,000,000 cubic feet.

Pittsburgh-West Virginia Gas Company, Nos. 1 and 2 Lough and No. 1 Price tracts, 2,000,000 cubic feet each.

Carnegie Gas Company, Nos. 1 and 2 Morn tract, 2,500,000 cubic feet each.

Philadelphia Gas Company, Sperry tract, 2,500,000 cubic feet.

Pentress Gas Company, No. 2 Tennant tract, 1,500,000 cubic feet.

Kanawha County.

South Penn Oil Company, Nos. 8 and 10 McCorkle tract, 105 and 100 barrels; No. 15 A. C. Skinner tract, 105 barrels.

Doddridge County.

Carter Oil Company, Chalfant and Doak tracts, 125 and 120 barrels.

Harrison County.

Hope Gas Company, Lowther tract, 150 barrels; Piggett tract, 120 barrels.

Lincoln County.

Columbia Gas and Fuel Company, Nos. 257 and 261 Guyandotte tract, 3,000,000 and 2,500,000 cubic feet.

Ritchie County.

Ward Oil Company, Markey tract, 1,500,000 cubic feet.

Wetzel County.

Hope Gas Company, No. 2 Pitts tract, 3,000,000 cubic feet.

MAY.

Mannington District.

Hope Gas Company, Lang, Smith, Strosnider, Sidebottom, Williams and Davisson tracts, 2,000,000, 2,000,000, 5,000,000, 3,000,000, 2,000,000 and 3,000,000 cubic feet.

Reserve Gas Company, Lancaster and Alfred tracts, 1,500,000 and 2,000,000 cubic feet.

Carnegie Gas Company, No. 3 Allen tract, and No. 1 Thomas tract, 4,000,000 and 2,000,000 cubic feet.

South Penn Oil Company, No. 4 Nicholson tract, 2,000,000 cubic feet.

Wetzel County.

Hope Gas Company, Cox and Murner tracts, 2,500,000 cubic feet each.

Manufacturers' Light and Heat Company, Wilcox tract, 3,000,000 cubic feet.

Ritchie County.

Gordon & Co., Layfield tract, 2,500,000 cubic feet.

Calhoun County.

Godfrey L. Cabot, Wilson tract, 4,000,000 cubic feeet.

Doddridge County.

Hope Gas Company, No. 12 Stalnaker heirs' tract, 100 barrels.

Kanawha County.

South Penn Oil Company, No. 9 McCorkle tract, 250 barrels, and No. 17 A. C. Skinner tract, 100 barrels.

Columbus Producing Company, Nos. 22 and 24 Williams Coal tract, 100 barrels each.

JUNE.

Mannington District.

Hope Gas Company, Campbell, Winemiller, Straley, Langford, Rymer, Price heirs', Wm. Price, McMillan and Merrimer tracts, 3,000,000, 2,500,000, 2,000,000, 2,000,000, 2,000,000, 3,000,000, 3,000,000, 2,000,000 and 3,000,000 cubic feet.

Reserve Gas Company, No. 4 Hudkins tract, 2,500,000 cubic feet.

E. Randolph, Fork tract, 2,000,000 cubic feet.

Philadelphia Gas Company, Lloyd, Knight, Jobes and Taylor tracts, 3,000,000; 2,000,000 each for last three wells.

E. L. Schroder, Snodgrass tract, 2,000,000 cubic feet.

Pentress Gas Company, Wright and Johnson tracts, 2,500,000 cubic feet each.

Carnegie Gas Company, Jobes heirs' and Thomas tracts, 2,500,000 and 2,000,000 cubic feet.

D. J. Carter & Co., Ingraham tract, 5,000,000 cubic feet.

Fairmont Gas Company, Shriver heirs' tract, 2,000,000 cubic feet.

Ritchie County.

Hope Gas Company, Cox tract, 2,000,000 cubic feet.

R. E. L. Frimire, Wilson tract, 2,500,000 cubic feet.

Roane County.

Sidney Oil Company, Hunt tract, 3,000,000 cubic feet.

Lincoln County.

Harshberger Oil and Gas Company, Beckett tract, 1,500,000 cubic feet.

Marion County.

J. J. Allen & Co., No. 1 Higginbotham tract, 1,680 barrels oil.

Doddridge County.

Hope Gas Company, Nicholson tract, 170 barrels.

Kanawha County.

Columbus Producing Company, Nos. 21, 23 and 25 Williams Coal tract, 150, 100 and 125 barrels.

JULY.

Mannington District.

Reserve Gas Company, Queen, White and Gall tracts, 2,000,000 cubic feet each.

Hope Gas Company, Neely, Sommerville and Swisher tract, 2,000,000 cubic feet.

Carnegie Gas Company, Cottrell tract, 2,500,000 cubic feet; Ross heirs' and Stevens tracts, 3,000,000 cubic feet each; Maxwell, Garner and Poling tracts, 2,000,000 cubic feet each.

Pentress Gas Company, Hull-Thomas tract, 2,000,000 cubic feet.

Hope Gas Company, Tuttle tract, 3,000,000 cubic feet.

Wayland Oil and Gas Company, Stout tract, 7,000,000 cubic feet.

Manufacturers' Light and Heat Company, Higginbotham tract, 4,000,000 cubic feet.

Wetzel County.

Hope Gas Company, Long and Elder tracts, 2,000,000 cubic feet each.

Calhoun County.

Godfrey L. Cabot, Holbert tract, 4,000,000 cubic feet.

Kanawha County.

Columbus Producing Company Nos. 29 and 30 Williams Coal tract, 200 and 100 barrels.

Ohio Fuel Oil Company, Kittinger tract, 100 barrels.

Doddridge County.

Carter Oil Company, No. 40 Swiger tract, 145 barrels.

Marion County.

F. W. Bartlett, No. 1 Z. Batson tract, 360 barrels.

AUGUST.

Mannington District.

Hope Gas Company, Coffindoffer, P. C. Gun, A. F. Gun Coal, McClain and Hayhurst tracts, 3,000,000, 2,000,000, 2,000,000, 2,500,000, 2,000,000 and 2,000,000 cubic feet.

Reserve Gas Company, Dillon tract, 2,000,000 cubic feet.

J. L. & D. S. Riker, Inc.

19 Cedar Street New York

Bicarbonate of Potash
Bichromate of Soda
Bleaching Powder
Carbonate of Ammonia
Caustic Potash
Caustic Soda
Chlorate of Potash
Chlorate of Soda
Chrome Alum
Formaldehyde
Indigo
Methyl Acetone
Muriate of Ammonia
Phosphoric Anhydride
Phosphorous
Silicate of Soda
Soda Ash
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1865 **Established Over Fifty Years** **1917**

Highest Quality Obtainable

BLUE VITRIOL

(Copper Sulphate)
(99% PURE)

Any amount for either Domestic or Export

Sole distributors for two plants' entire output

Fergusson Brothers

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Lombard 375

Manufacturers' Light and Heat Company, Davis tract, 2,000,000 cubic feet.
Ernest Randolph, Smith tract, 4,000,000 cubic feet.
Carnegie Gas Company, Soles and Earnshaw tracts, 2,500,000 and 2,000,000 cubic feet.
Philadelphia Gas Company, Clayton, Yarner, Crosgray tracts, 3,000,000 ,2,000,000 and 3,000,000 cubic feet.
J. J. Allen & Co., Ryan tract, 2,000,000 cubic feet.

Wetzel County.

Manufacturers' Light and Heat Company, Burley tract, 2,000,000 cubic feet.
Myers-Stone Company, Stone tract, 2,000,000 cubic feet.
Hope Gas Company, No. 2 Allen tract, 3,000,000 cubic feet.
Philadelphia Gas Company, Underwood tract, 2,000,000 cubic feet.

Tyler County.

Carter Oil Company, Pigott tract, 1,000,000 cubic feet.

Brooke County.

Rockledge Oil Company, Kirschner tract, 2,000,000 cubic feet.

Monongalia County.

Hope Gas Company, Lemley tract, 240 barrels.

SEPTEMBER.

Mannington District.

Hope Gas Company, Robinson, Merryman, Suttler, Coffman and Furbee tracts, 3,000,000, 4,000,000, 2,000,000, 2,500,000 and 2,500,000 cubic feet.
Sun Gas Company, Thompson tract, 5,000,000 cubic feet.
Carnegie Gas Company, Davis, Rinehart and Stevens tracts, 2,000,000, 2,500,000 and 1,500,000 cubic feet.
Philadelphia Gas Company, Norman tract, 2,000,000 cubic feet.
South Penn Oil Company, Coffman tract, 2,000,000 cubic feet.
Manufacturers' Light and Heat Company, White tract, 2,000,000 cubic feet.
Fairmont Gas Company, Wallace tract, 2,000,000 cubic feet.

Lewis County.

Carnegie Gas Company, Musgrave, Furbee, Himelrick and Smith tracts, 3,000,000 2,000,000, 3,000,000 and 2,000,000 cubic feet.
Manufacturers' Light and Heat Company, Bryan-Virgin tract, 2,500,000 cubic feet.
Hope Gas Company, Allen, Soles and Furbee Bros. tracts, 3,000,000, 2,000,000 and 2,000,000 cubic feet.
Trainer Bros., Davis tract, 2,500,000 cubic feet.
Philadelphia Gas Company, Garner tract, 2,000,000 cubic feet.
Pittsburgh-West Virginia Gas Company, Hiley and Bipescomb tracts, 2,000,000 cubic feet each.

Brooke County.

Miller Oil and Gas Company, Agnew tract, 1,500,000 cubic feet.

Marshall County.

Carnegie Gas Company, Thiel tract, 1,500,000 cubic feet.

Ritchie County.

Hope Gas Company, Marshall tract, 2,000,000 cubic feet.
Smith Whan, McGregor tract, 2,000,000 cubic feet.

Roane County.

Sidney Oil and Gas Company, No. 2 Taylor tract, 2,000,000 cubic feet.
United Fuel Gas Company, No. 4 Ward tract, 2,000,000 cubic feet.

Marion County.

F. M. Bartlett, No. 2 Z. Batson tract, 150 barrels.
Heckman & Huffman, No. 3 Alf. Kendall tract, 760 barrels.
Clayton Oil Company, W. Z. Hays tract, 150 barrels.
South Penn Oil Company, No. 2 Amelia Crouser tract, 150 barrels; No. 2 Hard-Batson tract, 400 barrels.
Delmar Oil Company, No. 24 J. L. Hays tract, 840 barrels.

Kanawha County.

Columbus Producing Company, Nos. 33 and 35 Williams Coal tract, 275 and 110 barrels.

OCTOBER.

Mannington District.

Rock Point Gas Company, No. 4 Snyder tract, 2,000,000 cubic feet.
Hope Gas Company, Lovell, Swiger, C. Nicholson tracts, 2,500,000, 1,500,000, 3,000,000 and 2,000,000 cubic feet.
Carnegie Gas Company, No. 7 Stevens tract, 3,000,000 cubic feet.
Philadelphia Gas Company, Cox tract, 2,000,000 cubic feet.
Marsh Oil and Gas Company, Snodgrass heirs' tract, 1,500,000 cubic feet.
Pittsburgh-West Virginia Gas Company, Strosnider tract, 3,500,000 cubic feet.
Pentress Gas Company, Hall-Thomas tract, 2,000,000 cubic feet.

Wetzel County.

Philadelphia Gas Company, No. 3 Earnshaw tract, 3,000,000 cubic feet; and No. 3 Carney tract, 2,000,000 cubic feet.
Carnegie Gas Company, No. 3 Bradley tract, 3,000,000 cubic feet, and No. 1 Curry and Rome tracts, 2,000,000 cubic feet each.
Hope Gas Company, No. 3 Allen tract, 2,500,000 cubic feet, and No. 4 Piggott tract, 2,000,000 cubic feet.
Manufacturers' Light and Heat Company, Mason, Soles and Bailey tracts, 2,500,000, 2,000,000 and 1,500,000 cubic feet.

Sistersville Field.

Philadelphia Gas Company, Hess, 2,500,000 cubic feet.

Doddridge County.

Hope Gas Company, No. 13 Stalneker tract, 125 barrels.

Kanawha County.

Columbus Producing Company, Nos. 34 and 57 Williams Coal tract, 100 and 400 barrels.

Wirt County.

Cox & Lockhart, No. 5 Robinson tract, 100 barrels.

Marion County.

F. M. Bartlett, No. 3 Z. Batson tract, 2,100 barrels.

NOVEMBER.

Mannington District.

Hope Gas Company, Lak, Wyant, Gumm, McMillan, Frazier, Ryner, McReynolds, Sutton and Parks tracts, 2,500,000, 2,000,000, 2,000,000, 2,500,000, 2,000,000, 3,000,000, 2,500,000, 2,000,000 and 2,000,000 cubic feet.
Carnegie Gas Company, Mason tract, 3,500,000 cubic feet.
Philadelphia Gas Company, Lanahan, Knight, Smith and Ford tracts, 4,000,000, 2,000,000, 1,500,000 and 2,000,000 cubic feet.
Sun Gas Company, Pierce and Smith tracts, 2,000,000 cubic feet each.

Wetzel County.

Carnegie Gas Company, Taylor tract, 3,000,000 cubic feet.
Manufacturers' Light and Heat Company, Burley, Teagardan, Kimball, Haught and Richmond tracts, 2,500,000, 5,000,000, 2,000,000, 2,000,000 and 2,000,000 cubic feet.
Hope Gas Company, No. 2 Wright, Roberts and Cunningham tracts, 2,500,000, 2,000,000 and 3,000,000 cubic feet.
Pittsburgh-West Virginia Gas Company, Barr tract, 2,500,000 cubic feet.
South Penn Oil Company, Nos. 55 and 59 Blackshere-Wells tract, 2,000,000 cubic feet each.

Wirt County.

Cox & Lockhart, No. 2 Robinson tract, 100 barrels.

Calhoun County.

Godfrey L. Cabot, Given and Ball tracts, 2,000,000 cubic feet each.

Marion County.

South Penn Oil Company, No. 3 Moore tract, 200 barrels.
Delmar Oil Company, No. 25 Z. L. Hays tract, 2,100 barrels.

Kanawha County.

United Fuel Gas Company, No. 3 Imperial Colliery Company's tract, 400 barrels.
Columbus Producing Company, No. 56 Williams Coal tract, 400 barrels.

Wirt County.

Red River Oil Company, No. 1 McClung-Duprey tract, 600 barrels.

Ritchie County.

Imperial Oil and Gas Products Company, No. 1 C. Dotson tract, 100 barrels.

DECEMBER.

Marion County.

Delmar Oil Company, No. 27 Hays tract, 460 barrels.
Carter Oil Company, Sarah Hays tract, 150 barrels.
West Virginia Traction Company, Rober tract, 2,500,000 cubic feet of gas.
Hope Gas Company, Toothman tract, 2,500,000 cubic feet of gas.

Kanawha County.

Ohio Fuel Oil Company, Nos. 2 and 3 Kittinger tract, 125 and 100 barrels.
Columbus Producing Company, No. 59 Williams Coal tract, 130 barrels.
Eagler Oil Company, No. 1 Crawford tract, 100 barrels.

Doddridge County.

Hope Gas Company, No. 3 Nicholson tract, 150 barrels; No. 1 Mason tract, 2,500,000 cubic feet gas; No. 1 Cheese tract, 2,500,000 cubic feet of gas.
Trainer Bros., Sperry tract, 2,000,000 cubic feet of gas.
Randolph & Lowther, Hurst tract, 2,000,000 cubic feet of gas.
Carnegie Gas Company, Ferribel tract, 2,500,000 cubic feet of gas.
Philadelphia Gas Company, Smith tract, 2,000,000 cubic feet of gas.
Pittsburgh & West Virginia Gas Company, Riley and Cox tracts, 2,000,000 cubic feet of gas each.

Wetzel County.

Hope Gas Company, Myers tract, 2,000,000 cubic feet of gas.
Philadelphia Gas Company, No. 5 Earnshaw tract, 1,500,000 cubic feet of gas; No. 1 Higginbotham tract, 2,000,000 cubic feet of gas; No. 1 Bartung tract, and No. 1 Throckmorton tract, 2,000,000 cubic feet of gas each.
Carnegie Gas Company, Taylor heirs' and Leroy Taylor tracts, 3,000,000 cubic feet of gas each.

Ritchie County.

Hope Gas ompany, Weidman tract, 1,500,000 cubic feet of gas.
Hope Gas Company, Weidman tract, 1,500,000 cubic feet of gas.
Philadelphia Gas Company, Fleming tract, 1,500,000 cubic feet of gas.

Roane County.

Goff & Hock, No. 2 Hedges tract, 2,000,000 cubic feet of gas.

Lewis County.

Philadelphia Gas Company, No. 6 Maxwell tract, 2,500,000 cubic feet of gas; No. 7 Maxwell tract, 2,500,000 cubic feet of gas.
Gilmer Coal Company, Rinehart tract, 2,000,000 cubic feet of gas.
Reserve Gas Company, Crook tract, 2,500,000 cubic feet of gas.
Hope Gas Company, Cullin tract, and No. 1 Wooster tract, 2,000,000 cubic feet of gas.

Harrison County.

Philadelphia Gas Company, Crenworth tract, No. 1 Allen tract; No. 1 Maxwell tract, 2,000,000 cubic feet of gas.
Reserve Gas Company, McDonald tract, 5,000,000 cubic feet of gas; No. 6 Maxwell tract, 2,500,000 cubic feet of gas.
W. Brent Maxwell, No. 39 Maxwell tract, 2,000,000 cubic feet of gas.
Hope Gas Company, Barnett and Bennett tracts, 2,000,000 feet of gas each.

Monongalia County.

Hope Gas Company, Gump heirs' tract, 2,500,000 cubic feet of gas.
Carnegie Gas Company, Park tract, 2,500,000 cubic feet of gas.
Pittsburgh & West Virginia Gas Company, Henderson tract, 2,000,000 cubic feet of gas.

Gilmer County.

Castle Brook Carbon Company, Burton tract, 2,000,000 cubic feet of gas.

Tyler County.

Manufacturers' Light and Heat Company, Bailey tract, 1,500,000 cubic feet of gas; No. 1 Shaw tract, 2,000,000 cubic feet of gas.
Hope Gas Company, Lewis tract, 2,000,000 cubic feet of gas.

Braxton County.

Mill Fork Oil and Gas Company, Bourne tract, 3,500,000 cubic feet of gas.

Pleasants County.

Pleasants Natural Gas Company, No. 6 Ward tract, 4,000,000 cubic feet of gas.
Carnegie Gas Company, Fair tract, 2,000,000 cubic feet of gas.

Calhoun County.

G. L. Cabot, No. 2 Whipkey tract, 1,500,000 cubic feet of gas.

Marshall County.

Patterson Glass Company, McCracken tract, 1,500,000 cubic feet of gas.

SOUTHEASTERN OHIO.

The Southeastern Ohio fields did very well during 1916 as in 1915, and averaged well with other parts of the high grade fields. During the year a total of 1,375 wells were finished, with a new production of 9,582 barrels, 76 gas wells and 411 dry holes. This is an increase over 1915 of 427 finished wells, 2,351 barrels new production, 25 gas wells and 129 dry holes.

The best results of the year came from the Clinton sand fields in Hocking, Perry, Licking and Muskingum counties. There is a lot of territory yet to drill in what is known as the deep sand fields, but with a low price of oil few felt like taking the chances, as the wells are very expensive and cost at the present price of pipe and material—close to from $10,000 to $12,000—are nearly double what they were a few years ago. Now the price of oil is improving rapidly and the chances are that more test work will be accomplished. But little will be done during the winter months, as the highways get so that it is almost impossible to move material over them.

During 1916 the wells finished in the Southeastern Ohio fields were by months as follows:—

Record for Year.

Month.	Comp.	Prod.	Gas.	Dry.
January	80	593	3	30
February	80	626	7	28
March	93	384	4	28
April	108	852	7	37
May	144	725	10	43
June	138	1,113	8	40
July	145	806	7	41
August	151	1,041	4	40
September	146	754	6	34
October	103	979	7	26
November	100	873	11	25
December	119	856	2	39
Totals	1,375	9,582	76	411
For 1915	948	7,231	51	282
Difference	427	2,351	25	129

Wells in the select class of 100 barrels or better for oil wells and 1,000,000-cubic foot gas wells were not very plentiful in the Southeastern Ohio field during the year of 1916. In 1914 there were forty-two of them. In 1915 there were thirty, and in 1913 there were fifty-nine of them. These wells were divided by months as follows for the year just past:—

FEBRUARY.

Hocking County.

Fisher Oil Company, No. 2 Lemon tract, 150 barrels.
Preston Oil Company, No. 1 Gordon tract, 100 barrels.

Licking County.

Planet Oil Company, No. 1 Kreager tract, 190 barrels.

MARCH.

Belmont County.

National Gas Company of West Virginia, Stonebraker tract, 1,500,000 cubic feet.

APRIL.

Perry County.

Ralph Bros., No. 1 Saffell tract, 280 barrels.

Hocking County.

Haydenville Oil Company, No. 7 fee tract, 100 barrels.

JUNE.

Hocking County.

Preston Oil Company, No. 5 Shaw tract, 205 barrels; Nos. 7 and 8 Stiers tract, 150 and 100 barrels; No. 2 Loomis tract, 100 barrels.

Licking County.

Planet Oil and Gas Company, No. 2 Kreager tract, 100 barrels.

Perry County.

Ralph Bros., No. 1 Frank Johnson tract, 100 barrels.

JULY.

Hocking County.

Preston Oil Company, No. 12 Stiers tract, 115 barrels.

Muskingum County.

Edward H. Everett Company, No. 10 O'Brien tract, 100 barrels.

AUGUST.

Knox County.

Farbing Drilling Company, No. 1 Robinson tract, 200 barrels.

Perry County.

Murphy, Murrin & Co., No. 2 Smith tract, 100 barrels.

Hocking County.

Fisher Oil Company, No. 2 Bryan tract, 100 barrels.

SEPTEMBER.

Hocking County.

Preston Oil Company, No. 14 Stiers tract, 100 barrels; No. 1 Devore tract, 200 barrels.
Ohio Fuel Supply Company, No. 4 Stiers tract, 150 barrels.

Perry County.

Ralph Bros., No. 2 Donahue tract, 250 barrels.
Columbus Oil and Fuel Company, No. 2 Forquor tract, 120 barrels.

Muskingum County.

Columbus Gas and Fuel Company, No. 1 Madden tract, 125 barrels.

OCTOBER.

Perry County.

Carter Oil Company, No. 4 Burgoon tract, 250 barrels.

Muskingum County.

Columbus Oil and Fuel Company, No. 3 Romine tract, 110 barrels; No. 3 George Madden tract, 160 barrels.
Edward H. Everett Company, No. 4 O'Bannon tract, 125 barrels.

Hocking County.

Fisher Oil Company, No. 1 Brian tract, 225 barrels.

NOVEMBER.

Hocking County.

Chartiers Oil Company, No. 113 Hocking Products tract, 100 barrels.
Preston Oil Company, No. 1 Patten heirs tract, 150 barrels.
Continental Oil Company, No. 2 Auchauer tract, 115 barrels.

DECEMBER.

Perry County.

Carter Oil Company, No. 6 Burgoon tract, 135 barrels.

CENTRAL OHIO GAS FIELD.

The Central Ohio gas field was not as active during 1916 as for the previous year, as most of the work accomplished during the year in review, the large gas companies instead of drilling in well defined territory have been testing out acreage that rentals have been paid on annually for a great number of years, and the gas question is getting to such a point that more prolific fields must be developed, so as to have an ample supply for the consumers connected to the gas lines, that the companies were compelled to look for some new territory, and by drilling what would be termed wildcat wells, the rentals are also saved which amounts to thousands upon thousands of dollars each year. By drilling a well the rental stops, even if the wells are dry holes, and then the leases are returned to the land owner, and should the wells prove productive gas wells, then the gas companies are anxious and willing to pay the gas royalty annual for each well which runs around $150 a year when the gas is used off the premises where the well is drilled. The Central Ohio gas field covers an area north and south from Lake Erie on the north to the southern extremities of Vinton county on the south, a distance of something like 200 miles, and east and west the field has been developed from ten to seventy-five miles in width. Some places the gas belt is narrow but wickens out again. The leading gas counties are:—Licking, Cuyahoga, Vinton, Richland, Wayne, Ashland, Medina, Hocking, Knox, Fairfield and Lorain. Much test work has been done in these counties during the year and some more remarkable gas wells have been uncovered. As an oil field the Central Ohio field is somewhat of a failure, with the exception of some parts of Hocking county, where some extra oil wells were drilled during the forepart of the year.

During 1916 there were 469 wells finished in what is known as the Central Ohio gas belt and 111 were dry holes, 322 gas wells, and 36 were oil wells, with a new oil production of 1,045 barrels. The field around Cleveland, in Cuyahoga county, as usual, took the lead in the gas area. During 1915 the field's activity was mostly on lots in the suburbs of Cleveland and wells were finished so rapidly that it was hard work to keep in touch with them, but the majority of these wells have been worthless for some time, as they were drilled so close together that the heavy drain upon the gas producing rock drained it within a short time. The development work at this time is confined almost entirely to gas tests, outside of the limits of Cleveland, and while the wells do not start with such large production, they are maintaining their average output to better advantage. Wayne and Vinton counties were also active and show a nice gas output. A record of each month's work in the field during 1916 is as follows:—

Work for the Year.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
January	56	10	157	35	11
February	55	2	70	40	13
March	31	1	40	23	7
April	27	10	523	10	7
May	23	1	20	14	8
June	30	2	50	20	8
July	39	3	90	28	10
August	46	2	25	33	11
September	47	1	20	36	10
October	30	1	15	22	7
November	51	1	5	32	18
December	34	2	30	31	1
Totals	469	36	1,045	322	111
For 1915	952	49	1,686	714	189

Gas Wells Finished Monthly.

The gas wells finished monthly, with the volume of the wells when first drilled in, are as follows:—

Month.	Gas wells.	Gas production.
January	35	59,503,662
February	40	92,308,340
March	23	31,839,000
April	10	21,975,237
May	14	28,582,000
June	20	37,218,110
July	26	48,979,611
August	33	53,824,121
September	36	67,853,063
October	22	35,290,104
November	32	63,463,000
December	31	50,648,133
Totals	322	593,482,381
For 1915	714	1,645,066,710
Difference	392	1,051,584,329

How Wells Were Distributed.

The wells for 1916 were distributed by counties as follows:—.

LICKING COUNTY.

Month.	Comp.	Gas.	Dry.
January	7	6	1
February	4	4	..
March	1	1	..
June	7	5	2
July	5	4	1
August	4	4	..
September	6	5	1
October	2	2	..
November	9	6	3
December	7	6	1
Totals	52	43	9
For 1915	48	42	6
Difference	4	1	3

CUYAHOGA COUNTY.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
January	35	8	127	23	4
February	34	1	50	29	4
March	20	..	..	15	5
April	11	3	68	5	3
May	8	1	20	6	1
June	9	1	25	6	2
July	12	2	65	9	1
August	11	1	5	8	2
September	12	1	20	8	3
October	5	..	..	3	2
November	6	..	..	4	2
December	6	1	15	5	..
Totals	169	19	395	121	29
For 1915	515	13	215	433	69
Difference	346	6	180	312	40

WAYNE COUNTY.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
January	2	..	..	1	1
February	5	..	..	1	4
March	2	..	..	2	..
April	4	..	..	2	2
May	3	..	..	3	..
June	2	1	25	1	..
July	8	..	..	6	2
August	4	..	..	4	..
September	9	..	..	7	2
October	3	..	..	1	2
November	11	..	..	8	3
December	8	..	..	8	..
Totals	61	1	25	44	16
For 1915	126	..	..	95	31
Difference	65	1	25	51	15

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SULPHUR BLACK S. A. P. 100%
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BISMARCK BROWN FF, Yellow Shade
BISMARCK BROWN 3-R, Red Shade

WOOL YELLOW S A. P.
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MALACHITE GREEN CRYSTALS

ACID SCARLET
WOOL SCARLET
LEATHER SCARLET
PAPER SCARLET
LAKE SCARLET
OIL SCARLET

FUR DYES

FUR BLACK STANDARD
FUR BLACK EXTRA
FUR BLUE BLACK

FUR BROWN B
FUR BROWN EXTRA

INTERMEDIATES

BETA NAPHTHOL CRUDE
BETA NAPHTHOL REFINED
SODIUM NAPHTOLATE

PARANITRANILINE
PARA NITROACETANILID

MONO SULPHONIC ACID 2:7

SCHAEFER ACID

PARA AMIDOPHENOL
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Obviously, therefore, Cannabis Indica is identical with Cannabis, and there is no distinction between the drug grown in the United States and that grown abroad, i.e., Cannabis grown in the United States which answers the description and requirements of the U.S.P., 9th, can legally be used to fill prescriptions or preparations calling for Cannabis Indica.

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SOLE SELLING AGENTS

Smith, Kline & French Co.

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ASHLAND COUNTY.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
January	2	1	10	..	1
February	2	..	..	..	2
March	3	..	..	3	..
May	2	..	..	1	1
June	4	..	..	4	..
July	3	..	..	..	3
August	12	..	..	6	6
September	6	..	..	4	2
October	8	..	..	6	2
November	10	..	..	5	5
December	5	..	..	5	..
Totals	57	1	10	34	22
For 1915	88	1	5	60	27
Difference	31	..	5	26	5

HOCKING COUNTY.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
February	2	1	20	..	1
March	1	1	40	..	..
April	7	6	450	..	1
May	1	..	..	1	..
September	1	..	..	1	..
October	1	..	..	1	..
November	2	..	..	..	2
Totals	15	8	510	3	4
For 1915	43	16	1,235	13	6
Difference	28	8	725	10	2

VINTON COUNTY.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
January	5	1	20	2	2
February	6	..	..	5	1
March	3	..	..	1	2
April	5	1	5	3	1
July	8	..	..	1	3
August	8	..	..	7	1
September	8	..	..	8	..
October	5	1	15	4	..
November	9	1	5	5	3
December	2	..	..	2	..
Totals	62	4	45	43	15
For 1915	41	6	96	21	14
Difference	21	2	51	22	1

RICHLAND COUNTY.

Month.	Comp.	Gas.	Dry.
May	2	1	1
June	1	1	..
August	2	1	1
October	3	3	..
November	1	1	..
December	2	2	..
Totals	11	9	2
For 1915	32	22	10
Difference	21	13	8

MEDINA COUNTY.

Month.	Comp.	Oil wells.	Oil prod.	Gas.	Dry.
February	1	..	..	..	1
March	1	..	..	1	..
May	1	..	..	..	..
June	6	..	..	2	4
July	2	1	25	1	..
August	3	1	20	2	..
September	4	..	..	2	2
October	2	..	..	2	..
November	2	..	..	2	..
December	2	1	15	1	..
Totals	24	3	60	13	8
For 1915	28	4	35	13	11
Difference	4	1	25	..	3

KNOX COUNTY.

Month.	Comp.	Gas.	Dry.
January	3	3	..
February	1	1	..
June	1	1	..
Totals	5	5	..
For 1915	13	7	5
Difference	8	2	5

Note:—One well that produced 100 barrels of oil was drilled in Knox county in June, 1915, which makes the totals correct.

FAIRFIELD COUNTY.

Month.	Comp.	Gas.	Dry.
January	1	..	1
August	1	1	..
September	1	1	..
November	1	1	..
December	1	1	..
Totals	5	4	1
For 1915	7	4	3
Difference	2	..	2

LORAIN COUNTY.

Month.	Comp.	Gas.	Dry.
January	1	..	1
May	2	1	1
July	1	1	..
December	1	1	..
Totals	5	3	2
For 1915	5	2	3
Difference	..	1	1

HOLMES COUNTY.

Month.	Comp.	Gas.	Dry.
August	1	..	1

Note:—Three dry holes were drilled in Holmes county in 1915.

JACKSON COUNTY.

Month.	Comp.	Gas.	Dry.
May	1	..	1

COSHOCTON COUNTY.

Month.	Comp.	Gas.	Dry.
October	1	..	1

Note:—Two gas wells were drilled in Perry county, and one dry hole in Meigs county, in 1915, but no developments recorded for 1916.

Recapitulation.

The wells in each county for the year 1916 were as follows:—

County.	Comp.	Oil wells.	Gas.	Dry.
Licking	52	..	43	9
Cuyahoga	169	19	121	29
Wayne	61	1	44	16
Ashland	57	1	34	22
Hocking	15	8	3	4
Vinton	62	4	43	15
Richland	11	..	9	2
Medina	24	3	13	8
Knox	5	..	5	..
Fairfield	5	..	4	1
Lorain	5	..	3	2
Holmes	1	..	..	1
Jackson	1	..	..	1
Coshocton	1	..	..	1
Totals	469	36	322	111
For 1915	952	49	714	189
Difference	483	13	392	78

Total Wells and Production.

The total oil wells and production from each county during 1916 were as follows:—

County.	Oil wells.	Oil prod.
Ashland	1	10
Hocking	8	510
Medina	3	60
Wayne	1	25
Vinton	4	45
Cuyahoga	19	375
Totals	36	1,045
For 1915	49	1,686
Difference	13	641

Gas Wells and Volume of Gas.

The gas wells and volume of natural gas for each county during 1916 were as follows:—

County.	Gas wells.	Volume, cubic feet.
Licking	43	26,256,000
Cuyahoga	121	241,027,612
Wayne	44	107,413,364
Ashland	34	53,425,464
Hocking	3	5,792,000
Vinton	43	105,820,000
Richland	9	24,613,442
Medina	13	15,536,498
Knox	5	2,676,000
Fairfield	4	3,959,000
Lorain	3	6,964,000
Totals	322	593,482,381
For 1915	714	1,645,066,710
Difference	392	1,051,584,329

It has only been a very few years since the Central Ohio gas field has grown to such proportions. Something over twenty years ago the first gas of any value in the field was discovered in what is known as the Sugar Grove district, in Licking and Fairfield counties, and for years the work for gas was confined in those two counties. Several years ago some test work for oil was made in Medina and Lorain counties toward the northern part of Ohio, and from these tests some very fine gas wells were developed, and since then the north end of the field has been looked upon as the mainstay for natural gas in all parts of Ohio. The opening up of the Cleveland district in Cuyahoga county a little over two years ago brought the gas development right up to Lake Erie, and a real town lot drilling boom was inaugurated in Cleveland and its suburbs, and one of the most prolific gas fields in the country was uncovered there, but the close drilling of wells made the field of short life, and today many of the wells along the shore of the lake have been exhausted, and while there still remains some work in the Cleveland district it is nothing like it was during 1915. There is still an abundance of gas territory undrilled in Lorain, Medina, Ashland, Wayne and Richland counties, but the south end of the field, in Vinton county, is one of the most active developments at this time and bids fair to maintain the interest during 1917. Recently considerable leasing has been done to the west of the Central Ohio gas belt, and which will no doubt be in closer proximity to the Northwestern Ohio field than to the Central, but if gas is found it will be in an altogether different formation than the Clinton sand, more likely the Trenton limestone, the source of the early gas supply in the northwestern section of the State.

Whenever a gas well will produce a million cubic feet of natural gas in a day it is considered a gusher, while a few years ago a well that would produce double that volume was looked upon as of little value. What gas that has gone to waste in the years gone by would be sufficient to furnish a large city with light and heat for many years. The gas and oil wells of the Central Ohio field in the select list during the year of 1916 were distributed by counties and months as follows:—

JANUARY.

Licking County.

Heisey Gas Company, Swartz and Watkins tracts, 1,000,000 cubic feet each.

Columbus Natural Gas Company, Milliner and Reese tracts, 1,500,000 cubic feet each.

Knox County.

Upham Gas Company, McNamara tract, 1,000,000 cubic feet.

Wayne County.

Odenkirk & Co., Bell tract, 3,500,000 cubic feet.

Vinton County.

Central Contract Company, No. 5 Dunkle tract, 2,000,000 cubic feet, and No. 2, Bray tract, 1,500,000 cubic feet.

Cuyahoga County.

East Ohio Gas Company, Berea-Five Points, and Bagley-Engle tracts, 4,000,000 and 2,000,000 cubic feet.

Brook Park Oil and Gas Company, Brook Park-Berea tract, 2,000,000 cubic feet.

Milton Freshwater, Brook Park-Berea tract, 2,000,000 cubic feet.

Melrose Oil and Gas Company, Brook Park-Engle tract, 3,000,000 cubic feet.

L. G. Neely, Nos. 1 and 2 Brook Park-Engle tract, 5,000,000 cubic feet each.

Rocky River Development Company, No. 2 Sperry-Fisher tract, 2,000,000 cubic feet; No. 1 Center Ridge-Clegg tract, 2,000,000 cubic feet; No. 1 Clegg-Center Ridge tract, 1,500,000 cubic feet; No. 1 Asplin tract, 3,000,000 cubic feet, and No. 1 Biddulph tract, 1,500,000 cubic feet.

Kundtz & Hulse, No. 1 Gordon tract, 2,000,000 cubic feet.

Rushville Drilling Company, Farr tract, 2,000,000 cubic feet.

J. Meldren & Son, Nos. 1 and 2 Anderson tract, 3,000,000 and 2,000,000 cubic feet.

Cushing & Co., No. 2 Pease tract, 2,500,000 cubic feet.

FEBRUARY.

Licking County.

Columbus Natural Gas Company, Christ tract, 1,000,000 cubic feet.

Heisey Gas Company, Hartman tract, 1,000,000 cubic feet.

Wayne County.

Arco Oil and Gas Company, Gintner tract, 2,000,000 cubic feet.

Vinton County.

Central Contract Company, Smith tract, 1,750,000 cubic feet.

Ohio Fuel Supply Company, Ankron and Kruger tracts, 1,500,000 and 8,000,000 cubic feet.

Cuyahoga County.

East Ohio Gas Company, Rocky River-Storey tract, Prospect-French tract and Brook Park-Berea tract, 2,000,000 cubic feet each; No. 2 Berea-Brook Park tract, 2,500,000 cubic feet; No. 1 Otto Franks tract, 3,000,000 cubic feet; No. 1 Murray tract, 2,000,000 cubic feet; No. 1 Brusha tract, 1,000,000 cubic feet, and No. 1 Grubb tract, 3,000,000 cubic feet.

Butler Bros., Brook Park-Engle tract, 1,750,000 cubic feet.

Rocky River Development Company, Prospect-French tract, 2,000,000 cubic feet.

L. G. Neely, No. 3 Brook Park-Engle tract, 2,000,000 cubic feet.

Kundtz & Hulse, Grayton-Five tract, 3,000,000 cubic feet, and No. 1 Center Ridge tract, 1,500,000 cubic feet.

G. A. Stearns, Brook Park-South Cuyahoga tract, 2,000,000 cubic feet.

W. L. Benson, Brook Park-Engle tract, 1,500,000 cubic feet.

Cleveland Development Company, Hummel-Big Four tract, 2,000,000 cubic feet.

Cleveland Drilling and Development Company, Brook Park-Big Four tract, 2,000,000 cubic feet.

Melrose Oil and Gas Company, No. 5 Brook Park-Engle tract, 5,000,000 cubic feet; No. 1 Murray tract, 4,000,000 cubic feet, and No. 1 Klink tract, 2,500,000 cubic feet.

Milton Freshwater, Smith-Big Four tract, 10,000,000 cubic feet.

C. W. Lauder, William Dean tract, 2,500,000 cubic feet.

Rushville Drilling Company, J. Bartleman tract, 2,000,000 cubic feet.

Brook Park Development Company, Brook Park-Berea tract, 10,000,000 cubic feet.

Berea Pipe Line Company, Boesley tract, 2,000,000 cubic feet.

MARCH.

Medina County.

Medina Gas Company, Wallace tract, 2,500,000 cubic feet.

Wayne County.

Ohio Fuel Supply Company, Kinney tract, 1,250,000 cubic feet.

Cuyahoga County.

Rushville Drilling Company, Puritas Springs tract, 3,000,000 cubic feet.

John Fishel, Trumbull tract, 1,250,000 cubic feet.

Rushville Drilling Company, Anna Bartleman tract, 2,000,000 cubic feet.

Bock & Reynolds, Greenwald tract, 2,000,000 cubic feet.

Berea Pipe Line Company, Holtzworth tract, 1,500,000 cubic feet.

Corts & Bodkin, Hummel-Engle tract, 1,500,000 cubic feet.

Brook Park Gas Company, Brook Park-Big Four tract, 2,500,000 cubic feet.

Rocky River Development Company, Berea-Five Points tract, 2,000,000 cubic feet.

East Ohio Gas Company, Nos. 1 and 2, Berea-Five Points tract, 2,000,000 cubic feet each; No. 1 Brook Park-Berea tract, 2,000,000 cubic feet; No. 1 Berea-Hummel tract, 1,000,000 cubic feet, and No. 1 Five Points-Engle tract, 3,000,000 cubic feet.

APRIL.

Hocking County.

Preston Oil Company, No. 2 Duffy tract, 240 barrels; No. 5 Stiers tract, 225 barrels; No. 4 W. & E. Shaw tract, 170 barrels.

Ohio Fuel Supply Company, No. 1 Stiers tract, 165 barrels.

Wayne County.

Elise, Exline & McCall, Garber tract, 1,500,000 cubic feet.

Vinton County.

Ohio Fuel Supply Company, Mendenhall tract, 1,250,000 cubic feet, and No. 1 Collins tract, 4,000,000 cubic feet.

Kline & Co., Halluff tract, 6,500,000 cubic feet.

Cuyahoga County.

J. Meldren & Son, Laughlin tract, 2,750,000 cubic feet.

East Ohio Gas Company, Geigers Partition tract, 1,500,000 cubic feet.

Kundtz & Hulse, Arnold tract, 1,000,000 cubic feet, and No. 3 Farr tract, 2,000,000 cubic feet.

MAY.

Ashland County.

Ohio Fuel Supply Company, Franks tract, 2,000,000 cubic feet.

Hocking County.

Preston Oil Company, No. 9 Longstreth tract, 1,500,000 cubic feet.

Ohio Fuel Supply Company, Pittinger and Dawley tracts, 1,500,000 and 2,000,000 cubic feet.

Lorain County.

Highland Development Company, Nicholson tract, 2,500,000 cubic feet.

Wayne County.

Medina Gas Company, Gearhart tract, 1,000,000 cubic feet.

Benedum-Trees Company, McClarren tract, 2,500,000 cubic feet.

Pearsall-Wooster Preserving Company, fee tract, 2,000,000 cubic feet.

Vinton County.

Central Contract Company, Wm. Harden and B. W. Harden tracts, 2,500,000 and 2,000,000 cubic feet.

Cuyahoga County.

Kundtz & Hulse, Becker tract, 2,000,000 cubic feet.

Melrose Oil and Gas Company, No. 2 Klink tract, and No. 2 Murray tract, 2,000,000 cubic feet each.

Berea Pipe Line Company, Kline tract, 2,000,000 cubic feet

Milton Freshwater, Geiger tract, 1,000,000 cubic feet.

JUNE.

Licking County.

Columbus Natural Gas Company, Fallett tract, 1,000,000 cubic feet, and No. 2 Meredith tract, 2,000,000 cubic feet.

Knox County.

Ohio Fuel Supply Company, Woods tract, 1,000,000 cubic feet.

Ashland County.

Logan Gas Company, Andres tract, 1,000,000 cubic feet, and No. 1 Hiner tract, 1,250,000 cubic feet.

Medina County.

Medina Gas Company, Nettleton tract, 2,000,000 cubic feet.

Logan Gas Company, Tubbs tract, 1,000,000 cubic feet.

Wayne County.

Ohio Fuel Supply Company, Grimelsberger tract, 3,500,000 cubic feet.

Richland County.

Logan Gas Company, Bemiller tract, 4,000,000 cubic feet.

Cuyahoga County.

Kundtz & Hulse, Ward tract, 4,500,000 cubic feet.

Logan Gas Company, Lewis tract, 1,250,000 cubic feet.

Berea Pipe Line Company, Summers tract, 2,000,000 cubic feet.

Rocky River Development Company, Nos. 1 and 2 Tetgamire tract, 2,000,000 and 4,000,000 cubic feet.

JULY.

Hocking County.

Ohio Fuel Supply Company, No. 2 Stiers tract, 185 barrels.

Wayne County.

Logan Gas Company, J. Lucas tract, 2,250,000 cubic feet, and No. J. A. Lucas tract, 5,000,000 cubic feet.

Ohio Fuel Supply Company, Lingle tract, 7,000,000 cubic feet.

Medina Gas Company, No. 2 Snyder tract, 2,000,000 cubic feet.

Vinton County.

Central Contract Company, No. 9 George tract, 1,500,000 cubic feet, and No. 2 Wm. Harder tract, 2,500,000 cubic feet.

Ohio Fuel Supply Company, Atwood, Herron and Slagel tracts, 1,500,000, 5,000,000 and 2,750,000 cubic feet.

Cuyahoga County.

American Building Brick Company, Forty-ninth street tract, 1,000,000 cubic feet.

Farr Brick Company, H plant, 2,000,000 cubic feet.

J. L. Stadler, plant four, 2,000,000 cubic feet.

Kundtz & Hulse, Becker tract, 1,500,000 cubic feet.

Milton Freshwater, Stumpp tract, 2,000,000 cubic feet.

East Ohio Gas Company, Brady tract, 4,000,000 cubic feet.

AUGUST.

Ashland County.

Logan Gas Company, Dan Kick, W. Guthrie, J. C. Anderson and J. Hammin tracts, 3,500,000, 2,500,000, 1,500,000 and 2,500,000 cubic feet.

Ohio Fuel Supply Company, No. 2 Noggle tract, 1,000,000 cubic feet.

Medina County.

Logan Gas Company, Gardner tract, 3,500,000 cubic feet.

Wayne County.

Medina Gas Company, D. Yost tract, 4,000,000 cubic feet.

Logan Gas Company, Landis tract, 1,500,000 cubic feet.

Richland County.

Logan Gas Company, Trumpower tract, 5,000,000 cubic feet.

Cuyahoga County.

Logan Gas Company, Johnson tract, 2,000,000 cubic feet.

East Ohio Gas Company, Greeley and Ward tracts, 1,500,000 and 1,000,000 cubic feet.

Kundtz & Hulse, Griffin tract, 2,500,000 cubic feet.

Mellen & Son, Cahoon tract, 1,000,000 cubic feet.

Rocky River Development Company, No. 3 Tetgamier tract, 3,000,000 cubic feet.

Highland Development Company, Stearns tract, 1,250,000 cubic feet.

Vinton County.

Ohio Fuel Supply Company, Waldron and Allen tracts, 4,500,000 and 2,500,000 cubic feet.

Logan Producing Company, Martindill tract, 3,500,000 cubic feet.

Central Contract Company, No. 3 Thomas Albins tract, 3,000,000 cubic feet, and No. 1 Parrish tract, 1,500,000 cubic feet.

SEPTEMBER.

Licking County.

Ohio Fuel Supply Company, Williams and Fry tracts, 1,500,000 cubic feet each.

Ashland County.

Logan Gas Company, Guthrie tract, 6,000,000 cubic feet.

Wayne County.

Logan Gas Company, Lucas and Miller-Springs tracts, 1,500,000 and 4,500,000 cubic feet.

Ohio Fuel Supply Company, Auckerman tract, 10,000,000 cubic feet.

Medina Gas Company, Strouse and Myers tracts, 4,500,000 and 1,500,000 cubic feet.

Cuyahoga County.

Kundtz & Hulse, No. 2 Griffin tract, 5,000,000 cubic feet.

Highland Development Company, Neat tract, 1,000,000 cubic feet.

Rocky River Development Company, No. 4 Tetgamier tract, 4,000,000 cubic feet.

Rushville Drilling Company, No. 2 Bauer tract, 2,000,000 cubic feet.

Highland Development Company, Stearns tract, 1,500,000 cubic feet.

Vinton County.

Ohio Fuel Supply Company, Ramsey and Bethel tracts, 2,500,000 and 1,000,000 cubic feet.

Central Contract Company, Hartley, Smith, Tomlinson and Rose tracts, 1,500,000, 3,500,000, 8,000,000 and 2,500,000 cubic feet.

OCTOBER.

Ashland County.

Logan Gas Company, Busler, Crone and Brubaker tracts, 3,000,000, 2,500,000 and 5,000,000 cubic feet.

Ohio Fuel Supply Company, Shambaugh tract, 1,250,000 cubic feet.

Medina County.

Medina Gas Company, Earnhart tract, 1,250,000 cubic feet.

Wayne County.

Medina Gas Company, Gayhart tract, 3,000,000 cubic feet.

Richland County.

Logan Gas Company, Smith tract, 2,500,000 cubic feet.

Ohio Fuel Supply Company, Purvine tract, 3,000,000 cubic feet.

Cuyahoga County.

Logan Gas Company, J. Manning tract, 3,000,000 cubic feet.

Vinton County.

Ohio Fuel Supply Company, Cassell and Ringer tracts, 3,500,000 and 1,500,000 cubic feet.

Logan Producing Company, No. 2 Martindale tract, 1,500,000 cubic feet.

NOVEMBER.

Licking County.

Heisey Gas Company, No. 4 Swartz tract, 2,000,000 cubic feet.

Fairfield County.

Ohio Fuel Supply Company, Hamilton tract, 1,500,000 cubic feet.

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Ashland County.

Logan Gas Company, Ernsberger, Obrecht and Shaffer tracts, 5,000,000, 2,000,000 and 2,000,000 cubic feet.

Ohio Fuel Supply Company, Weltmer tract, 1,500,000 cubic feet.

Medina County.

Medina Gas Company, Pythian Sisters tract, 2,500,000 cubic feet.

Wayne County.

Logan Gas Company, Naftzger, Snyder and Richards tracts, 4,000,000, 7,000,000 and 3,000,000 cubic feet.

Ohio Fuel Supply Company, No. 3 Lingle tract, 3,000,000, and No. 2 Gearhart tract, 2,500,000 cubic feet.

Rocky River Development Company, Snyder tract, 4,000,000 cubic feet.

Vancouver & Co., May tract, 1,500,000 cubic feet.

Logan Gas Company, Rowe tract, 4,500,000 cubic feet.

Cuyahoga County.

Berea Pipe Line Company, Cline tract, 1,000,000 cubic feet.

Logan Gas Company, No. 2 McLaughlin tract, 2,000,000 cubic feet.

Kundtz & Hulse, Gayton tract, 3,500,000 cubic feet.

C. W. Cushing, Calusen tract, 2,500,000 cubic feet.

Vinton County.

Ohio Fuel Supply Company, No. 2 Blackstone tract, 2,000,000 cubic feet.

Central Contract Company, Jordan and Hewitt tract, 3,500,000 cubic feet each.

DECEMBER.

Licking County.

Columbus Natural Gas Company, Reese tract, 1,000,000 cubic feet.

Fairfield County.

Ohio Fuel Supply Company, Fry tract, 1,000,000 cubic feet.

Ashland County.

Ohio Fuel Supply Company, Brubaker tract, 5,000,000 cubic feet.

Logan Gas Company, Bittinger tract, 1,500,000 cubic feet.

Lorain County.

Ohio Fuel Supply Company, Diemling tract, 2,750,000 cubic feet.

Wayne County.

Plymouth Oil and Gas Company, Franks tract, 5,000,000 cubic feet.

Medina Gas Company, No. 2 Gearhart tract, 2,000,000 cubic feet, and No. 2 Myers tract, 1,500,000 cubic feet.

Ohio Fuel Supply Company, Lingle, Yost and Grimeslspecter tracts, 6,500,000, 2,000,000 and 1,000,000 cubic feet.

Plymouth Oil and Gas Company, Hower tract, 2,000,000 cubic feet.

Richland County.

Ohio Fuel Supply Company, Hammond tract, 3,000,000 cubic feet.

Logan Gas Company, Peterson tract, 3,000,000 cubic feet.

Cuyahoga County.

Logan Gas Company, Asplin tract, 2,000,000 cubic feet.

Kundtz & Hulse, Booker tract, 2,000,000 cubic feet.

Rocky River Development Company, Purfitt tract, 1,000,000 cubic feet.

Melrose Oil and Gas Company, Mitchell tract, 3,500,000 cubic feet.

Vinton County.

Ohio Fuel Supply Company, Gardner and Martindale tracts, 2,500,000 and 3,500,000 cubic feet.

NORTHWESTERN OHIO.

In the petroleum fields of Northwestern Ohio during the year of 1916 there was a nice gain in finished wells, production and dry holes, which was unlooked for at the start of the season, as 1915 developed into one of the smallest years in the history of the field. It is hard to believe, but still it is true, that a total of 690 wells were finished the past year, of which 69 were dry holes and 10 gas wells, and the 620 oil wells showed a new daily production of 9,301 barrels. This, when compared with the work for the previous year, indicates an increase in finished wells of 439, in dry holes 43, and in production 4,715 barrels. This same territory that most of the wells for the year were drilled upon is territory that was drilled over back more than twenty years ago, and after the wells practically stopped producing the territory was considered worthless, but after standing a few years was redrilled and has found to be productive. This would put to the bad the theory that when once the oil is drained that it will never come back. There are still thousands of acres of this old abandoned territory that should be fit for redrilling, and it looks much as though the early spring will show a move in that direction, and at the same time efforts will be made to extend the old producing area to the south toward Cincinnati. It cannot extend to the east, owing to the rapid dip in the formation from whence the oil comes. To the east comes the Central Ohio field, where the oil is found in the Clinton limestone, while in Northwestern Ohio the output is derived from the Trenton limestone, which is known to be at least 1,000 feet thick and lies far below the Clinton formation. If the good prices of oil at the wells continue through the coming summer the old field will see a regular old-time boom and many wells will be drilled. Since oil was discovered in Northwestern Ohio and in Lima, in 1884, there has been a total of 67,983 wells drilled, and figuring the Central Ohio and Southeastern Ohio fields wells drilled, it would show more than 125,000 wells drilled in the State and nearly on a par with the number drilled in Pennsylvania since the original Drake well in 1859 was drilled.

The wells for the year of 1916 were distributed by months as follows:—

Wells for the Year.

Month.	Comp.	Prod.	Gas.	Dry.
January	34	482	1	6
February	28	475	2	6
March	47	742	..	2
April	62	839	1	5
May	75	770	..	8
June	74	970	..	7
July	71	944	..	8
August	78	937	..	6
September	71	755	1	9
October	58	851	2	4
November	74	957	2	8
December	37	599	1	1
Totals	699	9,301	10	69
For 1915	260	4,586	10	26
Difference	439	4,715	..	43

Producing oil wells, 620.

Average production per well per day, 15 barrels.

Wells by Counties.

The above wells were distributed by the various counties each month during the year as follows:—

WOOD COUNTY.

Month.	Comp.	Prod.	Gas.	Dry.
January	8	147	..	..
February	8	180	..	1
March	18	371	..	1
April	26	308	..	4
May	21	260	..	1
June	23	262	..	2
July	23	323	..	3
August	25	259	..	3
September	21	182	..	4
October	14	192	2	..
November	25	241	1	1
December	13	222	..	1
Totals	239	2,947	3	21
For 1915	127	2,101	4	6
Difference	112	846	1	15

HANCOCK COUNTY.

Month.	Comp.	Prod.	Gas.	Dry.
January	6	20	1	..
February	4	30	3	..
March	5	106	..	..
April	9	76	..	..
May	9	100	..	1
June	9	99	..	..
July	13	104	..	1
August	14	84	..	2
September	14	124	..	..
October	14	220	..	..
November	11	194	1	..
December	7	135	..	..
Totals	114	1,414	3	4
For 1915	38	412	..	4
Difference	76	1,002	3	..

SANDUSKY COUNTY.

Month.	Comp.	Prod.	Gas.	Dry.
January	4	30	..	1
February	4	40	..	..
March	9	33	..	..
April	8	46	1	..
May	8	50	..	..
June	11	45	..	3
July	9	87	..	..
August	9	55	..	..
September	7	40	..	..
October	6	42	..	..
November	7	32	..	..
December	3	11	..	..
Totals	85	537	1	4
For 1915	28	106	..	1
Difference	57	431	1	3

SENECA COUNTY.

Month.	Comp.	Prod.	Dry.
January	7	159	3
February	4	163	1
March	4	70	1
April	7	321	..
May	9	21	4
June	9	197	..
July	7	42	1
August	4	282	1
September	5	61	1
October	3	40	1
November	7	172	2
December	2	55	..
Totals	68	1,583	15
For 1915	24	1,654	6
Difference	44	71	9

MERCER COUNTY.

Month.	Comp.	Prod.	Gas.	Dry.
March	1	25	..	..
April	3	55	..	..
May	4	70	..	..
June	8	80	..	..
July	6	140	..	2
August	7	157	..	..
September	11	257	1	2
October	8	237	..	..
November	9	44	..	3
December	3	13	..	..
Totals	60	1,084	1	7
For 1915	4	38	..	1
Difference	56	1,046	1	6

VAN WERT COUNTY.

Month.	Comp.	Prod.	Dry.
January	3	56	..
February	4	28	2
March	3	53	..
April	2	6	..
May	7	136	1
June	5	175	..
July	5	100	..
August	3	35	..
September	2	16	..
October	1	10	..
November	5	160	1
December	1	25	..
Totals	38	800	4
For 1915	6	58	1
Difference	32	742	3

ALLEN COUNTY.

Month.	Comp.	Prod.	Dry.
January	3	40	..
February	1	20	..
March	3	19	..
April	5	45	1
May	2	25	..
June	3	53	..
July	3	30	..
August	3	25	..
September	4	33	1
October	4	90	..
November	5	80	..
Totals	37	430	2
For 1915	9	120	..
Difference	28	310	2

OTTAWA COUNTY.

Month.	Comp.	Prod.	Dry.
January	1	10	..
February	1	8	..
March	1	25	..
April	1	1	..
June	3	34	..
July	2	18	..
August	2	15	..
September	5	35	..
October	2	30	..
November	4	34	..
December	4	65	..
Totals	26	275	..
For 1915	5	46	1
Difference	21	229	1

AUGLAIZE COUNTY.

Month.	Comp.	Prod.	Dry.
January	3	20	2
February	1	..	1
March	2	18	..
April	1	1	..
May	2	8	..
June	3	20	2
July	2	10	1
August	1	25	..
September	1	..	1
October	5	20	3
December	2	70	..
Totals	23	192	10
For 1915	8	25	3
Difference	15	167	7

Note.—One gas well drilled in Auglaize county in 1915.

LUCAS COUNTY.

Month.	Comp.	Prod.	Dry.
March	1	5	..
July	2	30	..
September	1	1	..
December	1	3	..
Totals	5	39	..
For 1915	6	26	1
Difference	1	13	1

Note.—Two gas wells drilled in Lucas county in 1915.

WYANDOT COUNTY.

Month.	Comp.	Prod.	Dry.
May	1	..	1
For 1915	3	..	1
Difference	2	..	..

Note.—Two gas wells drilled in Wyandot county in 1915.

HARDIN COUNTY.

Month.	Comp.	Prod.	Gas.
February	1	..	1

CRAWFORD COUNTY.

Month.	Comp.	Prod.	Gas.
December	1	..	1

PUTNAM COUNTY.

Month.	Comp.	Prod.	Dry.
November	1	..	1

Note.—No wells were drilled in Putnam, Hardin and Crawford counties in 1915. Two gas wells were drilled in Erie county in 1915, but none in 1916.

In the year of 1916 there were 657 old wells pulled out and abandoned, as they had exhausted the oil in the wells, and were by months as follows:—

Abandoned Wells.

Month.	
January	25
February	39
March	18
April	20
May	59
June	41
July	69
August	59
September	70
October	102
November	64
December	91
Total	657

The above abandoned wells were distributed among the various counties of Northwestern Ohio as follows:—

County.	Abandoned.
Wood	100
Hancock	22
Sandusky	26
Seneca	3
Mercer	36
Van Wert	41
Allen	237
Ottawa	91
Auglaize	3
Lucas	89
Total	657
For 1915	663
Difference	6

Wells of 100 or More Barrels.

The wells of 100 barrels or more in the Northwestern Ohio fields were distributed as follows:—

WOOD COUNTY.

February.

Ohio Oil Company, No. 8 Dehnhoff tract, 100 barrels.

April.

Clarence Potter, No. 12 J. Priest tract, 200 barrels.

July.

Ohio Oil Company, No. 14 Killian tract, 100 barrels.

October.

A. B. Spear, No. 2 Fearnsides tract, 140 barrels.

December.

Ohio Oil Company, No. 41 Northwestern Gas Company's tract, 100 barrels.

SENECA COUNTY.

January.

The Sun Company, No. 3 Strohm tract, 100 barrels.

February.

The Sun Company, No. 8 Einsel tract, 100 barrels, and No. 17 Moore tract, 100 barrels.

April.

The Sun Company, No. 10 Einsel tract, 200 barrels, and No. 5 Strohm tract, 100 barrels.

June.

The Sun Company, No. 12 Einsel tract, 100 barrels

August.

The Sun Company, No. 4 Randall tract, 275 barrels.

VAN WERT COUNTY.

May.

Van Vleck-Stow Oil Company, No. 6 Pollock tract, 165 barrels.

MERCER COUNTY.

August.

Harry Kelley Company, Fox tract, 100 barrels.

September.

G. L. Watson, No. 3 Huffman tract, 100 barrels.

AUGLAIZE COUNTY.

December.

Woeplin Oil Company, Grassley tract, 100 barrels.

INDIANA FIELDS.

During the year of 1916 there were only twenty-nine wells finished in what is known as the old Trenton Limestone fields of Eastern Indiana and 238 wells were finished in the western section of the State, in the Wabash Valley section. Since the first gas well was struck in Indiana during the latter 'eighties there has been a total of more than 36,000 wells finished. There is oil in the older fields, but the failure of the natural gas utilized for fuel purposes and drilling and pumping the wells gave out a few years ago, and the wells are small and there appears to be no profit in pumping them with crude oil, coal or wood for fuel, hence the decline in the development work of the old field. The day will come, and that not far distant, when it will pay a handsome revenue by the drilling over of the old territory that has been passed up for some years back. The year of 1916 proved much more active than during 1915, owing to the work accomplished in the western portion of the State. The wells for 1916 were drilled by months as follows:—

Wells by Months.

Month.	Comp.	Prod.	Gas.	Dry.
January	10	296	1	6
February	17	182	1	7
March	26	292	2	11
April	22	148	..	13
May	37	488	1	14
June	32	524	..	10
July	26	282	..	10
August	21	317	..	7
September	21	539	1	5
October	18	371	..	8
November	18	205	1	8
December	13	113	1	5
Totals	267	3,554	8	98
For 1915	102	2,521	8	87
Difference	75	1,033	..	11

Producing oil wells, 161.

Average per well per day, 21½ barrels.

The above wells were distributed by months during the year in each district as follows:—

Sullivan District.

Month.	Comp.	Prod.	Gas.	Dry.
January	13	226	1	5
February	10	75	1	5
March	14	150	1	6
April	13	125	..	8
May	26	412	1	9
June	16	218	..	5
July	12	179	..	4
August	10	119	..	3
September	6	200	..	1
October	6	61	..	1
November	3	87	..	..
December	3	3	..	2
Totals	132	1,862	4	49
For 1915	122	1,720	4	52
Difference	10	140	..	3

Oakland City District.

Month.	Comp.	Prod.	Gas.	Dry.
January	2	70	..	..
February	4	52	..	2
March	6	82	..	3
April	6	10	..	4
May	6	30	..	4
June	8	83	..	2
July	7	61	..	2
August	6	80	..	2
September	6	255	1	..
October	3	51	..	..
November	9	20	1	7
December	7	72	1	3
Totals	70	872	3	28
For 1915	22	201	2	11
Difference	48	671	1	17

Princeton District.

Month.	Comp.	Prod.	Dry.
January	1	..	1
March	2	10	1
April	1	5	..
May	2	10	..
June	1	10	..
August	3	13	1
September	4	60	1
October	1	6	..
November	3	11	1
December	1	30	..
Totals	19	155	5
For 1915	9	20	5
Difference	10	127	..

Riley District.

Month.	Comp.	Prod.	Dry.
February	2	45	..
March	3	50	1
May	1	30	..
June	1	30	..
July	2	..	2
September	1	10	..
December	1	3	..
Totals	11	168	3
For 1915	17	545	4
Difference	6	377	1

Peru District.

Month.	Comp.	Prod.	Dry.
February	1	..	..
April	1	10	..
May	2	..	2
July	3	30	2
October	2	25	..
November	1	12	..
Totals	10	87	4

Montpelier District.

Month.	Comp.	Prod.	Dry.
June	2	33	..
August	1	..	1
September	2	2	1
October	1	..	1
Totals	6	35	3

Camden District.

Month.	Comp.	Prod.	Dry.
September	2	..	2
October	1	75	..
November	1	70	..
Totals	4	145	2
For 1915	2	4	..
Difference	2	141	2

NOTE.—One gas well was drilled in Camden district in 1915.

Parker City District.

Month.	Comp.	Prod.	Dry.
June	3	150	2
For 1915	2	2	..
Difference	1	148	..

Note.—One gas well was drilled in the Parker City district in 1915.

Marion District.

Month.	Comp.	Prod.	Dry.
July	1	8	..
August	1	5	..
October	1	10	..
Totals	3	23	..
For 1915	1	..	1
Difference	2	..	1

Keystone District.

Month.	Comp.	Prod.	Dry.
October	2	18	..

Daviess District.

Month.	Comp.	Prod.	Dry.
October	1	25	..
December	1	5	..
Totals	2	30	..
For 1915	4	15	3
Difference	2	15	3

Spencer District.

Month.	Comp.	Prod.	Dry.
June	1	..	1
July	1	4	..
Totals	2	4	1

Muncie District.

Month.	Comp.	Prod.	Dry.
November	1	5	..
For 1915	2	6	1
Difference	1	..	1

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Decatur District.

Month.	Comp.	Prod.	Gas.
March	1	..	1

Warrick District.

Month.	Comp.	Prod.	Dry.
April	1	..	1
For 1915	2	..	2
Difference	1	..	1

Wells Finished in Each District.

The wells finished in each district for the year were as follows:—

Districts.	Comp.	Prod.	Gas.	Dry.
Sullivan	132	1,862	4	49
Oakland City	70	872	3	28
Princeton	19	135	..	5
Riley	11	168	..	3
Peru	10	87	..	4
Montpelier	6	35	..	3
Camden	4	145	..	2
Parker City	3	150	..	2
Marion	3	23	..	..
Keystone	2	18	..	..
Daviess	2	30	..	..
Spencer	2	4	..	..
Decatur	1	..	1	..
Muncie	1	5	..	..
Warrick	1	..	..	1
Totals	267	3,554	8	98

Abandoned Wells.

The abandoned wells which are worthless for pumping purposes further have been pulled out from each district as follows for 1916:—

Oakland City district	7
Princeton district	6
Montpelier district	26
Camden district	49
Parker City district	6
Marion district	77
Geneva district	131
Keystone district	64
Huntington district	72
Muncie district	80
Total	518
For 1915	721
Difference	203

Wells of 100 or More Barrels.

The Indiana wells of 100 barrels or more were as follows by counties and months:—

Sullivan County.

May.

Ohio Oil Company, No. 4 and 5 De Baum tract, 130 and 110 barrels.

August.

Ohio Oil Company, No. 17 J. V. Merrill tract, 100 barrels.

September.

Ohio Oil Company, No. 19 J. V. Merrill tract, 160 barrels.

Parker City District.

June.

T. F. Adams, Adams tract, 150 barrels.

Oakland City District.

August.

A. B. Bement, No. 8 Thomas tract, 100 barrels.

September.

M. Murphy, Bassinger tract, 225 barrels.

KENTUCKY FIELD.

Two new fields were practically opened up in Kentucky during 1916. Both fields showed some drilling before, but nothing of any great value was discovered until the year in review. These fields were the Irvine district, in Estill county, and the Scottsville field, in Allen county, and which were the two leading producers for the year. In the Estill field three pipe lines were laid from the main trunk line to the field and lateral lines from these three lines to a great many wells throughout the county, although at the close of the year but a little over half the wells had been connected to the pipe lines, as the territory is very hilly and hard for the line layers to get around, and then the installing of pump stations and heavy pumping engines and the building of storage and everything that takes time. The Estill operators have no kick coming from the pipe line, as the Cumberland Pipe Line Company, under the supervision of Superintendent Bahan, has done wonderful work in the extensions of the lines. In the Scottsville field the producer has not done as well, as the oil is shipped by tank cars and only part of the time can enough cars be had to make an impression on the production, which is now close to 2,000 barrels a day, and which could be easily doubled, if not trebled, if the pipe lines were there to handle the output.

During the year small production was found in wildcat work in Barren, Lee, Whitley, Metcalf, Madison, Warren, Martin and Bath counties. It is estimated that with the opening of spring that the drill will be rushed over many counties in Kentucky, and that more than a thousand wildcat wells will be drilled during 1917, if the market price of oil remains stationary or goes above the $2-mark.

Work for the Year.

A summary of monthly completed work in the Kentucky field for the year is as follows:—

Month.	Comp.	Prod.	Gas.	Dry.
January	58	660	3	7
February	32	617	..	7
March	38	779	..	8
April	41	981	..	6
May	66	1,159	..	15
June	52	2,111	..	4
July	120	3,678	1	15
August	122	3,659	4	24
September	154	3,407	4	29
October	152	3,321	..	30
November	110	3,177	1	14
December	126	3,529	3	20
Totals	1,071	26,973	16	179
For 1915	92	728	..	36
Difference	979	26,245	16	143

The above figures explain more clearly the great activity in Kentucky and large increase for the year in review over the previous year than columns of writing could give. Kentucky today is the most promising field of any of the high grade sections east of the Mississippi River, and during 1917 the field will become more prominent or drop backward again, as all depends upon what will be found in the great amount of wildcat work that is being planned at this time.

Wells by Months.

The above wells were distributed by months during the year in each county as follows:—

Estill County.

Month.	Comp.	Prod.	Gas.	Dry.
January	51	625	3	4
February	23	419	..	4
March	20	542	..	2
April	28	682	..	2
May	35	773	..	5
June	35	1,875	..	1
July	77	2,002	..	3
August	94	2,995	2	16
September	101	2,991	1	9
October	131	3,029	..	24
November	82	2,449	..	5
December	95	2,929	..	10
Totals	770	22,211	6	85

Allen County.

Month.	Comp.	Prod.	Gas.	Dry.
January	2	27	..	..
February	2	80	..	..
March	7	205	..	2
April	6	290	..	..
May	12	295	..	4
June	5	150	..	..
July	29	579	1	8
August	13	580	1	2
September	26	350	2	10
October	10	260	..	..
November	10	601	..	1
Decen.ber	9	460	..	1
Totals	131	3,877	4	28

Wayne County.

Month.	Comp.	Prod.	Dry.
January	2	5	1
February	3	12	1
March	6	7	3
April	7	9	3
May	7	11	5
June	5	12	2
July	8	32	2
August	4	5	3
September	6	8	2
October	2	2	..
November	3	..	3
December	3	..	3
Totals	56	103	27

Powell County.

Month.	Comp.	Prod.	Gas.	Dry.
January	1	..	..	1
April	1	..	..	1
May	3	40	..	..
June	3	55	..	..
July	1	125	..	..
August	3	55	..	1
September	15	41	..	6
October	1	..	..	1
November	1	75	..	..
December	3	10	1	..
Totals	32	401	1	10

Wolfe County.

Month.	Comp.	Prod.	Dry.
February	1	5	..
March	1	5	..
April	1	..	1
May	1	4	..
June	1	4	..
August	1	4	..
October	1	15	..
November	2	40	..
December	4	65	..
Totals	13	132	1

Lawrence County.

Month.	Comp.	Prod.	Dry.
January	1	3	..
February	1	1	..
March	2	10	..
May	6	35	..
July	2	10	..
August	2	8	..
September	2	7	..
October	1	5	..
November	3	10	1
December	1	5	..
Totals	21	94	1

Morgan County.

Month.	Comp.	Prod.	Dry.
January	1	..	1
February	2	..	2
March	1	..	1
August	2	5	..
December	1	25	..
Totals	7	30	5

One gas well was drilled in Morgan county in August.

Barren County.

Month.	Comp.	Prod.	Dry.
May	1	..	1
June	1	10	..
September	2	5	1
November	3	7	..
Totals	7	22	2

Rockcastle County.

Month.	Comp.	Prod.	Gas.	Dry.
August	2	..	..	2
September	1	..	1	..
October	1	..	..	1
November	1	..	..	1
December	3	..	..	3
Totals	8	..	1	7

Lee County.

Month.	Comp.	Prod.	Dry.
October	2	10	1
December	2	25	1
Totals	4	35	2

Whitley County.

Month.	Comp.	Prod.	Dry.
November	1	..	1
December	1	10	..
Totals	2	10	1

Jackson County.

Month.	Comp.	Prod.	Dry.
September	1	..	1
October	2	..	2
Totals	2	..	3

Metcalf County.

Month.	Comp.	Prod.	Dry.
August	1	7	..
October	1	..	1
November	1	5	..
December	1	..	1
Totals	4	12	2

Madison County.

Month	Comp.	Prod.	Dry.
June	2	5	1

Warren County.

Month.	Comp.	Prod.	Dry.
May	1	1	..
November	1	..	1
Totals	2	1	1

Montgomery County.

Month.	Comp.	Prod.	Dry.
July	2	..	2

Martin County.

Month.	Comp.	Prod.	Dry.
March	1	10	..

Bath County.

Month.	Comp.	Prod.	Gas.	Dry.
July	1	30	..	..
November	1	..	1	..
December	1	..	..	1
Totals	3	30	1	1

Floyd-Knott County.

Month.	Comp.	Prod.	Dry.
November	1	..	1

Grayson County.

Month.	Comp.	Prod.	Gas.
December	1	..	1

Simpson County.

Month.	Comp.	Prod.	Gas.
December	1	..	1

Recapitulation.

The total wells finished in the various Kentucky counties in 1916 were as follows:—

County.	Comp.	Prod.	Gas.	Dry.
Estill	770	22,211	6	85
Allen	131	3,877	4	28
Wayne	56	103	..	27
Powell	32	401	1	10
Wolfe	13	132	..	1
Lawrence	21	94	..	1
Morgan	7	30	1	4
Barren	8	..	..	2
Rockcastle	8	..	1	7
Lee	4	35	..	2
Whitley	2	10	..	1
Jackson	3	..	..	3
Metcalf	4	12	..	2
Madison	2	5	..	1
Warren	2	1	..	1
Montgomery	2	..	..	2
Martin	1	10	..	..
Bath	3	30	1	1
Floyd-Knott	1	..	..	1
Grayson	1	..	1	..
Simpson	1	..	1	..
Totals	1,071	26,973	16	179

Kentucky Gushers.

The following gushers were drilled in the various Kentucky fields each month as follows:—

JANUARY.

Estill County.

Wood Oil Company, No. 7 Floyd Rogers tract, 125 barrels.

New Domain Oil and Gas Company, Nos. 1 and 2 McKinney tract, 150 barrels each.

FEBRUARY.

Estill County.

W. S. Raydure Company, No. 2 Williams tract, 150 barrels.

Wood Oil Company, Nos. 8 and 9 Rogers tract, 100 barrels each.

MARCH.

Estill County.

Wood Oil Company, No. 10 F. Rogers tract, 100 barrels.

Root-Hupp Company, Nos. 1 and 2 McIntosh tract, 100 barrels each.

New Domain Oil and Gas Company, Nos. 5, 6 and 7 McKinney tract, 100 barrels each.

Allen County.

Good Luck Oil Company, No. 8 Keen tract, 100 barrels.

APRIL.

Estill County

Wood Oil Company, No. 12 F. Rogers tract, 125 barrels.

Root-Hupp Company, Nos. 3 and 4 McIntosh tract, 120 and 100 barrels; No. 5, same tract, 120 barrels.

W. S. Raydure Company, Nos. 6, 8 and 9 Williams tract, 150, 110 and 110 barrels.

New Domain Oil and Gas Company, Nos. 9 and 10 McKinney tract, 200 and 125 barrels.

Allen County.

Snowden Bros., No. 15 Frost tract, 150 barrels.

MAY.

Estill County.

New Domain Oil and Gas Company, 11 McKinney tract, 100 barrels.

Rocky River Development Company, Marcum tract, 100 barrels.

Thompson & Co., Wise tract, 150 barrels.

Wood Oil Company, No. 13 Rogers tract, 125 barrels.

Allen County.

Ocala Oil Company, No. 7 Frost tract, 200 barrels.

JUNE.

Estill County.

Root-Hupp Company, Nos. 8 and 10 McIntosh tract, 150 and 100 barrels.

Thompson-Young Company, Nos. 2, 8 and 9 W. L. Marcum tract, 175, 200 and 300 barrels; No. 4, same tract, 150 barrels.

Wood Oil Company, No. 4 F. Rogers tract, 200 barrels, and No. 16 F. Rogers tract, 275 barrels.

Williams, Hare & Neely, Nos. 2 and 3 Wise tract, 200 and 100 barrels.

JULY.

Estill County.

C. J. Weideman & Co., Nos. 3, 4, 5 and 10 Marcum tract, 100 barrels each; Nos. 4 and 5 Wise tract, 100 barrels each.

Wood Oil Company, No. 3 J. M. Garrett tract, 150 barrels; No. 4 150 barrels.

New Domain Oil and Gas Company, Nos. 16 and 17 McKinney tract, 100 barrels each.

Hawkins, Bailey & Co., No. 1 Cole tract, 125 barrels.

J. E. Thompson, Powell tract, 125 barrels.

Powell County.

Cambrian Oil Company, D. Patrick tract, 160 barrels.

Allen County.

White Plains Oil Company, No. 20 Frost tract, 400 barrels.

Ocala Oil Company, No. 13 Frost tract, 100 barrels.

AUGUST.

Estill County.

United Oil Company, Nos. 6, 7 and 11 W. L. Marcum tract, 150, 150 and 100 barrels; No. 1 S. P. Marcum tract, 100 barrels; No. 6 Pasley tract, 100 barrels.

LeRoy Adams Oil Company, West tract, 150 barrels.

Van Oil Company, Watson tract, 100 barrels.

Puckett Oil Company, No. 3 Puckett tract, 100 barrels.

Allen county.

White Palins Oil Company, Nos. 24 and 25 Frost tract, 100 barrels each; No. 1 Lon Richards tract, 200 barrels.

SEPTEMBER.

Estill County.

United Oil Company, No. 12 W. L. Marcum tract, 100 barrels; No. 9 Pasley tract, 100 barrels.

G. B. Williams & Co., No. 6 Tyree tract, 100 barrels.

W. S. Raydure Oil Company, No. 9 T. McIntosh tract, 100 barrels; No. 5 Plas McIntosh tract, 125 barrels.

Wood Oil Company, Nos. 15 and 16 P. Rogers tract, 100 and 125 barrels.

LeRoy Adams Oil Company, Nos. 1, 2, 3 and 4 Chas. Tipton tract, 100 barrels each.

Allen County.

Snowden Bros., No. 1 Jones tract, 150 barrels; No. 1 Richards tract, 300 barrels; No. 7 Crowe tract, 150 barrels.

OCTOBER.

Estill County.

LeRoy Adams Oil Company, No. 2 West tract, 125 barrels.

Meidren & Keating, Nancy Kelley tract, 100 barrels.

United Oil Company, Nos. 8 and 10 Pasley tract, 150 and 125 barrels; No. 5 S. P. Marcum tract, 125 barrels.

G. B. Williams & Co., No. 7 Tyree tract, 100 barrels; No. 5 Henderson tract, 100 barrels.

Ohio Fuel Oil Company, No. 2 Maple tract, 250 barrels.

Wood Oil Company, No. 11 Garrett tract, 150 barrels; No. 17 F. Rogers tract, 125 barrels.

White, Newton & Moore, No. 2 Bratlin tract, 100 barrels.

Furnace Oil Company, No. 2 Tipton tract, 125 barrels.

Allen County.

White Plains Oil Company, No. 26 Frost tract, 100 barrels.

NOVEMBER.

Estill County.

Gaines, Marcum & Neely, Nos. 2 and 3 Edwards tract, 125 barrels each.

LeRoy Adams Oil Company, C. Tipton tract, 100 barrels.

United Oil Company, No. 4 Marcum tract, 125 barrels.

Ohio Fuel Oil Company, No. 3 Maple tract, 165 barrels.

Yates & Harshberger, Nos. 3 and 4 Rice tract, 150 and 200 barrels.

W. S. Raydure Company, No. 8 McIntosh tract, 100 barrels.

United Oil Company, No. 11 Pasley tract, 100 barrels.

Powell County.

White & Duff, Ashley tract, 100 barrels.

Allen County.

White Plains Oil Company, No. 2 Lon Richards tract, 290 barrels.

Petroleum Oil and Gas Company, Tucker tract, 200 barrels.

Ocala Oil Company, No. 17 Frost tract, 100 barrels.

DECEMBER.

Estill County.

Gaines, Marcum & Neely, No. 1 Young tract; No. 4 Edwards tract, 100 barrels each.

United Oil Company, Nos. 14 and 16 Pasley tract; No. 9 S. P. Marcum tract, 100 barrels each.

W. S. Raydure Oil Company, No. 16 Williams tract, 100 barrels.

Meidren & Keating, Nos. 2, 3, 4 and 5 A. Q. Wilson tract, 100 barrels each.

J. T. Hervey, Nos. 3, 4, 5 and 6 Henderson tract; No. 3 Powell tract, 100 barrels each.

Dr. Young Company, Nos. 1 and 2 Dan Miller tract, 100 barrels each.

The Hobart Scott Company, No. 11 Hare-Young tract, 100 barrels.

Allen County.

Snowden Bros., No. 3 Lon Richards tract, 250 barrels.

Petroleum Oil and Gas Company, No. 2 Tucker tract, 125 barrels.

TENNESSEE FIELD.

For years the hills of Tennessee have been looked upon with disdain by the average oil man, owing to the early days when so much work was done in the northern tier of counties along the southern boundary line of Kentucky, when hundreds of thousands of dollars were sunk in wells with no real return. This does not signify that Tennessee is no good as an oil field, as the facts are that the possibilities are just as good, if not better, than in Kentucky. When the drilling was done years ago oil was very cheap, and when oil was found there was practically no outlet for it by pipeline, and to ship it by tank cars to any refinery and make anything on it was out of the question, but now things are different and the year of 1917 should experience a revival of work throughout the State; in fact, from the north to the south section. The late find of a reported 100-barrel oil well in Atlanta is enough to encourage work through the center of Tennessee. During the past few months thousands upon thousands of acres of land have been blocked up by oil men, not the small fry, but companies that have an abundant capital to go ahead with the work of developing the fields which are known to exist. The lease shark is not in abundance in the new fields, as was the case in many of the new developed fields of other States, as he has a fear of not realizing on his small investments in taking leases, or that his will be compelled to linger some time before he could dispose of them to the real oil man.

There are spots in Tennessee where, during the first real excitement of many years ago, wells at a depth of 75 feet showed to be large paying producers, but no market caused the owners to let the wells go and hunt fields that the production could be handled from.

During 1916 there were a few wells drilled in Tennessee, especially in Scott county. The Oneida pool in that county failed to make any showing of production during the year, but the drilling of two wells in the southwest corner of Scott county, in the Glen Mary section, showed that oil exists there in what would be considered paying quantities. The wells for the year were distributed by months as follows:—

Wells for the Year.

Month.	Comp.	Prod.	Dry.
January	13	..	13
July	5	..	5
September	1	25	..
November	1	20	..
Totals	20	45	18
For 1915	12	250	7
Difference	8	205	11

There were 19 of these wells located in Scott county. Seventeen of them were in and around the Oneida development and all were dry, the other two being in the Glen Mary section, with a production of 45 barrels. One was located in Fentress county, and was dry.

ILLINOIS FIELD.

The good price of oil at the wells that prevailed during 1916 in the Illinois field brought back the usual activity and nearly double the number of wells were finished that were during the year 1915. The State has not a very good prospect for the future, as there is nothing now in sight in the way of a pool outside of the present defined territory, but the new year, with still better prices for oil, may encourage more wildcat work, and something may be discovered before the year has passed. There are still many locations to drill in defined territory, but in the more shallow sands nothing but light pumpers can be expected, while in the deep sands better results may be obtained. There are two counties in the State that may be the leaders for the new year. Lawrence county, with its several producing sands, will possibly take the lead as far as productive wells are concerned, and Wabash county, while a very spotted field, certainly has some pro-

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ductive areas in it, as the Allendale Oil Company and the Sian Oil Company drilled in some very good wells during the year in review. The belt is a very narrow one and in some places it is not over 200 feet wide, and many dry holes are drilled in lining up the belt, as it does not run in a straight line, but zig-zags like a river or creek bed. Crawford county, known as the Robinson field, has been the most active for the year and finished close to one-half the wells of the year, and might take the lead again during the new year, but the wells will not be as productive as the two counties mentioned. Very little Illinois producing property is changing hands, as the owners prefer to keep it on account of its good staying production, especially in the Lawrence county field, where each well has several pay sands to draw from. The three leading producing sands are the Kirkwood, Tracy and McCloskey sands, the latter being the deeper pay sand; in fact, the three sands are the three lowest known producing pays in the field, with the more shallow sands known as the Casey, Bridgeport, Ridgley, Buchannan, Stray and Sour sands. Many of the old wells were only drilled as deep as the Buchanan sand, which is found at about 1,300 feet, and in time these wells will be drilled to the other deep sands, which may improve the output of the wells to a large extent.

Since the oil developments of Illinois started a few years ago there has been a total of 24,313 wells drilled in the field, of which 20,644 were oil producing wells and 4,669 were dry holes or gas wells, which is a good record for a field less than fifteen years old. The wells finished during 1915 were by months as follows:—

Wells for the Year.

Month.	Comp.	Prod.	Gas.	Dry.
January	92	984	7	26
Febry	82	1,105	6	18
March	119	2,339	4	28
April	93	1,056	1	21
May	160	2,678	4	37
June	184	2,828	6	37
July	142	2,647	1	25
August	150	2,957	2	30
September	142	2,700	1	28
October	103	1,857	3	30
November	110	2,478	..	23
December	66	1,134	..	14
Totals	1,459	24,713	36	317
For 1915	756	14,055	18	197
Difference	703	10,658	18	120

Wells by Months.

The above wells were finished by counties each month during the year as follows:—

Crawford County.

Month.	Comp.	Prod.	Gas.	Dry.
January	41	206	4	15
February	25	289	5	4
March	38	506	2	13
April	35	325	1	9
May	54	560	1	18
June	77	615	6	19
July	49	627	..	13
August	67	790	2	14
September	67	718	1	17
October	45	527	3	11
November	56	666	1	9
December	34	252	..	9
Totals	508	6,071	26	151
For 1915	215	1,766	8	55
Difference	353	4,305	18	96

Clark County.

Month.	Comp.	Prod.	Gas.	Dry.
January	16	250	2	1
February	11	176	..	2
March	20	645	1	1
April	19	121	..	6
May	27	457	..	5
June	38	374	..	7
July	37	607	1	3
August	33	420	..	4
September	14	184	..	..
October	7	145	..	..
November	24	274	..	5
December	10	96	..	2
Totals	256	3,749	4	36
For 1915	141	1,914	1	33
Difference	115	1,835	3	3

Lawrence County.

Month.	Comp.	Prod.	Dry.
January	12	279	4
February	12	360	2
March	19	779	2
April	10	126	2
May	24	839	3
June	29	1,225	4
July	21	881	3
August	29	1,566	4
September	23	934	4
October	27	893	4
November	26	1,078	1
December	11	580	..
Totals	246	9,540	33
For 1915	157	6,329	27
Difference	89	3,211	6

Note.—One gas well was drilled in Lawrence county in 1915.

McDonough County.

Month.	Comp.	Prod.	Dry.
January	14	139	2
February	13	145	1
March	31	234	4
April	17	175	..
May	40	410	4
June	27	279	2
July	18	187	1
August	18	128	4
September	15	97	2
October	5	40	2
November	12	73	..
Totals	210	1,858	25
For 1915	130	2,602	32
Difference	80	737	7

Cumberland County.

Month	Comp.	Prod.	Gas.	Dry.
January	4	100	1	..
February	7	80	..	1
March	2	..	..	2
April	5	64	..	..
May	5	35	2	..
June	1	5	..	..
July	6	35	..	..
August	2	27	..	..
September	4	66	..	..
November	1	5	..	..
December	3	17	..	..
Totals	40	434	3	3
For 1915	44	810	2	4
Difference	4	376	1	1

Clinton County.

Month	Comp.	Prod.	Dry.
January	1	5	..
February	3	42	..
April	3	..	3
May	6	85	3
June	6	140	4
July	4	5	3
August	3	14	2
September	2	..	2
October	2	..	2
November	1	..	1
December	2	..	2
Totals	33	291	22
For 1915	2	..	2
Difference	31	291	20

Wabash County.

Month.	Comp.	Prod.	Dry.
February	1	..	1
March	1	135	..
April	2	200	1
May	4	240	1
June	1	150	..
July	3	275	1
August	1	..	1
September	5	625	1
October	4	300	3
November	4	350	2
December	3	160	1
Totals	29	2,325	12
For 1915	6	328	1
Difference	23	1,997	11

Marion County.

Month.	Comp.	Prod.	Dry.
February	1	10	1
March	1	..	1
May	2	40	..
July	2	20	..
September	7	71	1
October	9	47	5
November	3	17	1
December	1	12	..
Totals	26	217	8
For 1915	6	270	..
Difference	20	53	8

Hancock County.

Month.	Comp.	Prod.	Dry.
January	4	..	4
March	3	50	2
April	2	46	..
May	5	12	2
June	3	30	..
July	2	10	1
August	2	10	1
September	1	5	..
November	1	5	..
Totals	23	167	10
For 1915	9	..	9
Difference	14	167	1

Coles County.

Month.	Comp.	Prod.	Dry.
January	1	5	..
February	1	5	..
June	2	10	1
August	1	2	..
September	1	..	1
October	2	..	2
November	2	20	1
December	1	15	..
Totals	11	57	5
For 1915	3	35	1
Difference	8	22	4

Macoupin County.

Month.	Comp.	Prod.	Gas.	Dry.
February	4	..	1	3
March	1	..	1	..
May	1	..	1	..
Totals	6	..	3	3
For 1915	10	5	6	3
Difference	5	5	3	..

Henderson County.

Month.	Comp.	Prod.	Dry.
October	2	5	1
December	1	2	..
Totals	3	7	1

Bond County.

Month.	Comp.	Prod.	Dry.
Febrdary	2	..	2

Brown County.

Month.	Comp.	Prod.	Dry.
March	2	..	2

Schuyler County.

Month.	Comp.	Prod.	Dry.
March	1	..	1
For 1915	17	..	17
Difference	16	..	16

Other Counties.

In Saline county a dry hole was drilled in February, also one the same month in Jackson county, and in May a dry hole was drilled in Fayette county.

Abandoned Wells.

The abandoned wells in the Illinois field for 1916 were by counties as follows:—

Crawford county	64
Lawrence county	47
Clark county	30
Clinton county	4
Total	145
For 1915	155
Difference	10

GUSHERS FOR 1916.

The gushers for the year of 1916 in the Illinois field were by months and counties as follows:—

JANUARY.

Clark County.

Ohio Oil Company, No. 26 Dutro tract, 120 barrels.

Cumberland County.

Central Refining Company, No. 3 Phillips tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 29 Ryan tract, and No. 3 Tongow tract, 100 barrels each.

FEBRUARY.

Clark County.

Ohio Oil Company, No. 12 Blankenship tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 34 Applegate tract and No. 1 Zeller tract, 100 barrels each.

MARCH.

Clark County.

Kewanee Oil and Gas Company, No. 24 Lee tract, 100 barrels.

Ohio Oil Company, No. 5 Rings tract, 110 barrels, and No. 40 Partlow tract, 330 barrels.

Crawford County.

Ohio Oil Company, No. 5 Allison tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 30 Ryan tract, 100 barrels; No. 10 Middagh tract, 100 barrels, and No. 35 Applegate tract, 125 barrels.

Wabash County.

Sian Oil and Gas Company, No. 2 Jordan tract, 125 barrels.

APRIL.

Crawford County.

Ohio Oil Company, No. 9 Siler tract, 100 barrels.

Wabash County.

Mark Price, No. 1 Courtier tract, 280 barrels.

MAY.

Clark County.

Ohio Oil Company, No. 42 Partlow tract, 170 barrels.

Lawrence County.

Ohio Oil Company, No. 5 Taylor tract, 100 barrels; No. 4 Bardon tract, 150 barrels, and No. 24 Lewis tract, 100 barrels.

Wabash County.

Mark Price Company, No. 2 Courtier tract, 170 barrels.

Sian Oil and Gas Company, No. 3 Jordan tract, 100 barrels.

JUNE.

Clark County.

Ohio Oil Company, No. 11 Brisco tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 8 Withers tract, 125 barrels; No. 16 Buchanan tract, 100 barrels; No. 17 Ryan No. 2 tract, 100 barrels; No. 6 Seed No. 2 tract, 310 barrels, and No. 3 King tract, 100 barrels.

Clinton County.

Frogtown Oil and Gas Company, Kock tract, 110 barrels.

Wabash County.

Allendale Oil Company, No. 3 Courtier tract, 150 barrels.

JULY.

Clark County.

Ohio Oil Company, No. 43 Partlow tract, 100 barrels, and No. 11 F. Partlow tract, 125 barrels.

Crawford County.

Nehrer Oil Company, No. 2 Nethery tract, 120 barrels.

Ohio Oil Company, No. 11 Goff tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 49 L. K. Leighty tract, 125 barrels, and No. 19 Kirkwood tract, 100 barrels.

Kewanee Oil and Gas Company, No. 22 Stallings tract, 100 barrels.

Wabash County.

Sian Oil and Gas Company, No. 5 Jordon tract, 120 barrels.

Allendale Oil Company, No. 4 Courtier tract, 125 barrels.

AUGUST.

Clark County.

Ohio Oil Company, No. 13 Blankenship tract, 110 barrels.

Crawford County.

Ohio Oil Company, No. 5 Mary Hoke tract, 125 barrels; No. 12 Goff tract, 100 barrels.

American Oil Development Company, No. 16 Short tract, 300 barrels.

Lawrence County.

Ohio Oil Company, No. 32 Gould tract, 200 barrels; No. 6 Buchanan tract, 500 barrels, and No. 9 Ridgley tract, 225 barrels.

SEPTEMBER.

Crawford County.

Ohio Oil Company, Nos. 6 and 7 Hoke tract, 100 barrels each.

Wm. O'Mara Company, No. 3 Laurence tract, 110 barrels.

Lawrence County.

Ohio Oil Company, No. 14 Gillespie tract, 150 barrels, and No. 5 A. Gillespie tract, 125 barrels.

Wabash County.

Sian Oil and Gas Company, No. 3 Biehl tract, 100 barrels, and No. 6 Jordan tract, 225 barrels.

Allendale Oil Company, No. 5 Courtier tract, 225 barrels.

OCTOBER.

Crawford County.

Ohio Oil Company, No. 12 Biddle tract, 160 barrels.

Wm. O'Mara Company, No. 5 Laurence tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 6 J. Gould tract, 125 barrels, and No. 7 J. A. Wiswall tract, 100 barrels.

Wabash County.

Allendale Oil Company, No. 6 Courtier tract, 225 barrels.

NOVEMBER.

Crawford County.

Ohio Oil Company, No. 8 Petty tract, 110 barrels; No. 1 Reynolds tract, 100 barrels, and No. 5 Goff tract, 100 barrels.

Lawrence County.

Ohio Oil Company, No. 5 J. J. Gould tract, 200 barrels.

Wabash County.

Sian Oil and Gas Company, No. 4 Biehl tract, 150 barrels.

Allendale Oil Company, No. 1 King tract, 225 barrels.

Lawrence County.

Ohio Oil Company, No. 50 L. K. Leighty tract, 100 barrels; No. 24 Vandermark tract, 100 barrels, and No. 44 T. P. Gillespie tract, 100 barrels.

Parks Oil and Gas Company, No. 7 Tracy tract, 100 barrels.

DECEMBER.

Lawrence County.

Ohio Oil Company, No. 25 Vandermark tract, 100 barrels, and No. 12 Skiles tract, 100 barrels.

Wabash County.

Sian Oil and Gas Company, No. 5 Biehl tract, 150 barrels.

Eastern Pipe Line Statistics for 1916.

The statistical end of the oil industry, in the way of the amount of crude oil run from the wells and the deliveries, present many interesting comparisons. In the high grade fields east of the Mississippi River during the year of 1916 there were 35,550,805.64 barrels run from the wells, and the deliveries of oil for the same period amounted to 48,104,291 barrels, over 12,000,000 more barrels thon were produced. This would indicate the cause of the rapid advance in both crude oil at the wells and the finished products from the crude.

The runs listed from the Pennsylvania fields include Pennsylvania, Southern New York and West Virginia.

The runs and deliveries of oil during

Runs and Deliveries.

1916 from the fields east of the Mississippi River were as follows:—

Field.	Runs, barrels.	Deliveries, barrels.
Pennsylvania	15,494,125.98	27,396,000.30
Franklin, Pa., heavy	36,227.74	43,605.12
Southeastern Ohio	3,346,636.67	26,056.30
Cleveland, Ohio	21,208.38	20,578.01
Northwestern Ohio	2,074,879.66	5,535,360.88
Indiana	373,701.59	12,816,804.82
Illinois	13,159,274.06	2,201,531.17
Kentucky	1,144,751.56	64,364.40
Totals	35,550,805.64	48,104,291.00
1915	37,477,582.75	41,791,778.73

Stocks Held.

The stocks of oil held by the pipe lines at the close of 1916 in the above fields were as follows:—

Field.	Stocks, barrels.
Pennsylvania grades	4,136,215.40
Franklin, Pa., heavy	33,714.97
Southeastern Ohio	571,889.30
Northwestern Ohio	2,524,873.87
Cleveland, Ohio	1,425.51
Indiana	840,469.52
Illinois	2,755,533.30
Kentucky	197,557.20
Total	11,061,679.07
For 1915	16,026,902.36

PENNSYLVANIA GRADES.

The runs and deliveries of oil from the Pennsylvania, Southern New York, West Virginia and Southeastern Ohio, known as Pennsylvania grade oils, for each month of 1916 were as follows:—

Month.	Runs, barrels.	Deliveries, barrels.
January	1,201,146.30	2,121,245.29
February	1,168,859.70	2,135,686.15
March	1,307,600.81	2,097,787.38
April	1,274,706.73	2,403,269.47
May	1,397,649.99	2,404,153.44
June	1,335,238.90	2,578,058.32
July	1,277,777.11	2,533,223.34
August	1,348,528.71	2,385,150.86
September	1,248,872.81	2,225,308.33
October	1,335,490.44	2,163,575.39
November	1,311,961.68	2,226,517.13
December	1,286,202.80	2,119,013.20
Totals	15,494,125.98	27,396,000.30

Stocks on Hand.

The following were the stocks of oil in storage of Pennsylvania grades each month for 1916:—

Month.	Stocks, barrels.
January	6,586,779.24
February	6,833,776.38
March	7,059,603.48
April	6,733,327.60
May	6,430,674.18
June	6,219,401.29
July	6,119,404.96
August	6,116,578.42
September	5,877,727.19
October	6,003,309.80
November	5,573,019.41
December	4,136,215.40

FRANKLIN HEAVY OILS.

The runs and deliveries of Franklin, Pa., heavy oils each month for 1916 were as follows:—

Month.	Runs, barrels.	Deliveries, barrels.
February	2,327.37	.....
March	2,852.31	.....
April	3,202.49	.....
May	3,390.06	236.94
June	3,204.40	6,761.20
July	2,929.47	5,618.67
August	3,353.74	.....
September	2,786.35	482.81
October	2,714.80	6,398.62
November	2,889.82	12,589.98
December	2,883.73	10,939.27
Totals	36,227.74	43,605.12

Oil Stocks.

The stocks in storage of Franklin, Pa., heavy oils at the close of each month of 1916 were as follows:—

Month.	Stocks, barrels.
January	44,198.84
February	46,426.21
March	49,278.52
April	60,805.00
May	55,643.15
June	52,086.33
July	48,397.13
August	52,750.87
September	55,054.41
October	51,470.67
November	41,770.51
December	33,714.97

SOUTHEASTERN OHIO FIELD.

The runs and deliveries from the Southeastern Ohio field for each month for the year 1916 were as follows:—

Month.	Runs, barrels.	Deliveries, barrels.
January	258,932.00	.....
February	249,017.02	.....
March	279,903.34	480.74
April	271,072.59	967.00
May	290,707.59	1,284.66
June	311,731.45	4,495.32
July	286,042.81	748.91
August	297,725.12	2,425.32
September	270,648.82	1,679.56
October	283,194.05	3,835.31
November	282,049.81	6,009.22
December	266,612.07	5,119.87
Totals	3,346,636.67	26,056.30

Oil Stocks.

The stocks of oil on hand at the close of each month of 1916 in the Southeastern Ohio field were as follows:—

Month.	Stocks, barrels.
January	677,444.93
February	654,507.71
March	588,629.96
April	538,063.60
May	454,885.94
June	340,363.33
July	295,218.33
August	295,548.66
September	260,391.81
October	304,937.60
November	473,226.25
December	671,889.30

CLEVELAND FIELD.

The runs and deliveries of oil from the Cleveland, Ohio, field, each month for the year 1916 were as follows:—

Month.	Runs, barrels.	Deliveries, barrels.
January	1,392.45	1,221.73
February	1,166.81	1,206.78
March	1,348.31	1,468.57
April	873.66	459.12
May	1,919.45	1,944.57
June	1,919.45	1,944.57
July	2,443.08	2,588.20
August	2,014.03	2,185.63
September	2,506.01	2,209.96
October	1,794.29	1,719.52
November	2,013.86	2,158.48
December	1,816.98	1,470.93
Totals	21,208.38	20,578.01

Williamsburg Chemical Co.,

(INCORPORATED)

Brooklyn New York

Manufacturers of

Sulphur Black

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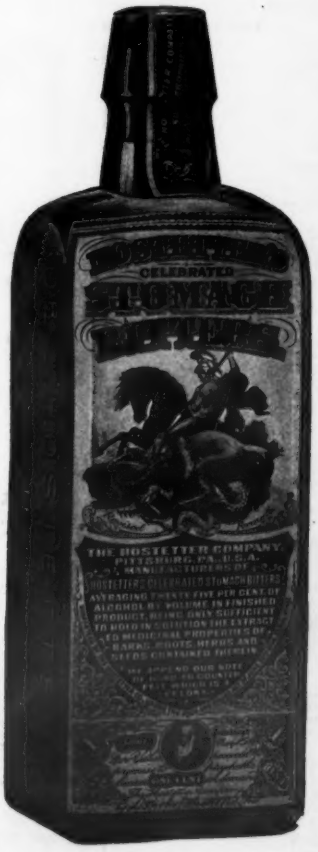

THE HOSTETTER COMPANY, 60 Water Street, PITTSBURGH, PA.

Storage Crude.

The oil stored at the close of each month of 1916 in the Cleveland field was as follows:—

Month.	Stocks, barrels.
January	422.30
February	416.85
March	332.30
April	778.05
May	992.05
June	992.03
July	915.61
August	768.71
September	1,049.10
October	1,173.35
November	1,650.34
December	1,425.51

NORTHWESTERN OHIO FIELD.

The runs and deliveries of crude oil from the fields of Northwestern Ohio for 1916 were, by months, as follows:—

Month.	Runs, barrels.	Deliveries. barrels.
January	163,324.26	581,388.10
February	164,918.06	522,632.13
March	188,136.55	686,767.40
April	175,247.19	670,846.35
May	191,017.71	405,380.89
June	185,400.17	387,769.56
July	176,591.16	224,400.19
August	180,702.63	350,722.08
September	167,322.70	362,195.75
October	172,534.86	555,386.50
November	162,159.28	465,133.41
December	147,564.03	315,738.53
Totals	2,074,879.66	5,535,360.88

Stocks in Storage.

The stocks of crude at the close of each month in the Northwestern Ohio field for 1916 were as follows:—

Month.	Stocks, barrels.
January	2,467,706.19
February	2,437,318.13
March	2,269,763.99
April	2,229,725.51
May	2,388,712.88
June	2,557,492.03
July	2,467,429.06
August	2,465,763.74
September	2,593,223.94
October	2,598,029.92
November	2,688,044.22
December	2,524,873.87

INDIANA FIELDS.

The runs and deliveries of oil from the Indiana field each month for 1916 were as follows:—

Month.	Runs, barrels.	Deliveries. barrels.
January	21,395.20	1,051,296.75
February	25,324.56	1,000,311.47
March	20,838.92	1,055,256.02
April	25,015.22	955,728.95
May	26,868.65	1,072,117.42
June	25,242.59	1,018,006.67
July	24,541.45	1,042,102.36
August	25,101.53	938,654.52
September	22,058.46	1,030,612.07
October	22,968.98	1,060,089.53
November	17,434.91	1,035,750.59
December	16,971.08	1,156,278.16
Totals	273,701.59	12,816,804.82

Storage Oil.

The storage oil in tanks in the Indiana field at the close of each month of 1916 was as follows:—

Month.	Stocks, barrels.
January	854,097.36
February	844,564.91
March	826,120.23
April	772,179.90
May	796,115.62
June	851,972.17
July	905,990.82
August	942,965.99
September	857,583.61
October	942,147.48
November	894,833.41
December	840,469.62

ILLINOIS FIELD.

The runs and deliveries of oil monthly in the Illinois field for 1916 were as follows:—

Month.	Runs, barrels.	Deliveries. barrels.
January	1,035,298.13	144,605.83
February	986,379.57	101,475.33
March	1,163,341.66	164,949.73
April	1,029,955.80	108,317.81
May	1,167,015.43	267,030.99
June	1,153,510.19	260,294.38
July	1,153,607.37	280,248.98
August	1,181,822.41	246,560.08
September	1,105,286.57	132,312.66
October	1,125,559.78	75,954.54
November	1,007,830.31	178,995.15
December	1,049,666.84	231,775.69
Totals	13,159,274.06	2,201,521.17

Oil in Storage.

Oil in storage at the close of each month of the year 1916 in the Illinois field was as follows:—

Month.	Stocks, barrels.
January	5,045,567.28
February	4,970,236.00
March	4,893,925.24
April	4,852,808.18
May	4,455,291.34
June	4,114,082.79
July	2,708,600.12
August	2,650,777.66
September	2,715,693.00
October	2,749,798.26
November	2,878,207.56
December	2,755,533.36

KENTUCKY FIELDS.

The runs and deliveries of oil for 1916 from the Kentucky fields were, by months, as follows:—

Month.	Runs, barrels.	Deliveries. barrels.
January	30,799.46	7,661.73
February	38,344.68	9,413.65
March	49,241.67	13,406.92
April	63,103.83	10,073.47
May	83,348.47	3,205.77
June	76,468.93	2,716.33
July	85,973.47	3,469.46
August	125,799.34	1,235.40
September	136,658.93	4,242.85
October	155,147.47	2,706.79
November	152,652.37	2,398.68
December	147,212.94	3,833.35
Totals	1,144,751.56	64,364.40

Oil in Storage.

The oil held in stock at the close of each month for 1916 in the Kentucky fields was as follows:—

Month.	Stocks, barrels.
January	189,751.67
February	160,455.17
March	167,869.57
April	117,629.54
May	124,404.13
June	125,274.14
July	127,262.42
August	159,368.04
September	160,625.42
October	176,920.12
November	189,867.44
December	197,557.20

ESTILL AND ALLEN COUNTIES AT HEAD OF KENTUCKY-TENNESSEE PETROLEUM FIELDS

Barbourville, Ky., Jan. 7, 1917.

A history of Kentucky petroleum operations during the year is mainly a history of developments in Estill and Allen counties, two new fields which during the year brought Kentucky into prominence as an oil-producing State. In these two counties most of the completed work of 1916 was registered, while the success which marked the work of the drill in these fields was reflected in the great increase in drilling operations throughout the State.

Total completions in Kentucky during the year numbered 1,075, as compared with a total of 92 completions for the year preceding. The 1916 new production approximated 26,993 barrels, in marked contrast to the preceding year's showing of 728 barrels. Tennessee, with 21 completions and a new production of 65 barrels, does not quite equal the 1915 record of 12 completions and 250 barrels, 18 dry holes figuring in the completed work.

One result of the showing made by the Estill and Allen county fields is shown in the record of drilling operations during the year, the first of January showing less than thirty rigs up and wells drilling and the corresponding period this year showing nearly two hundred rigs up and wells drilling.

Twenty-three Kentucky counties figured in the Kentucky record of petroleum developments during the year. Estill and Allen counties were centers of activity, with Powell, Wayne, Lawrence, Wolfe and Morgan following. A large number of counties outside the area of activity during 1915 figured in the 1916 record of drilling operations.

Production of petroleum from all the fields increased from an average of around 60,000 barrels in 1915 to nearly two hundred thousand barrels last year, the two new fields of Estill and allied counties contributing the bulk of this increase. Millions of dollars of new capital were brought into the field.

Completed Work in Kentucky in 1916.

An approximate summary of completed work in the Kentucky field for 1916 follows:—

Month.	Completions.	Production.	Dry.	Gas.
January	58	660	7	3
February	32	517	7	..
March	38	779	8	..
April	41	981	6	..
May	66	1,159	15	..
June	52	2,111	4	..
July	120	3,678	15	..
August	122	3,659	25	5
September	154	3,407	29	4
October	152	3,321	30	..
November	113	3,187	15	1
December	127	3,529	20	4
Totals	1,075	26,993	180	17

Completed Work in 1915.

Completions, 92; production, 728; dry, 36.

Completions were distributed by counties as follows:—

County.	Completions.	Production.	Dry.	Gas.
Wayne	56	106	27	..
Wolfe	13	132	1	..
Lawrence	21	94	1	..
Morgan	7	30	4	7
Estill	770	22,211	85	6
Allen	134	3,877	28	4
Powell	32	401	10	1
Martin	1	10	..	..
Knox	3	20	1	..
Warren	2	1	1	..
Montgomery	2	..	2	..
Madison	2	5	1	..
Bath	3	30	1	1
Barren	7	22	2	..
Carter	1	....	..	1
Metcalf	4	12	2	..
Rockcastle	8	....	7	1
Jackson	3	....	2	..
Lee	4	35	2	..
Floyd	1	10	..	..
Whitley	2	10	1	..
Grayson	1	....	..	1
Simpson	1	....	..	1
Totals	1,705	26,993	180	17

Completed Work in Tennessee in 1916.

Month.	Completions.	Production.	Dry.	Gas.
January	13	..	13	..
July	5	..	5	..
September	1	25	..	..
November	2	40	..	..
Totals	21	65	18	..

Tennessee Developments in Scott County.

Tennessee developments were confined to Scott county, the new production being found ten miles from the established area.

The Estill county shallow sand pool of Kentucky is perhaps the most productive and extensive of any yet developed in the United States. This region is, comparatively, a development of the past year, as operations were just beginning on a large scale during the close of 1915. An area extending twenty-five miles across the county has been proven. The width of the proven area extends about ten miles, with the limits of production not yet established. The Estill county field had its beginning in a few wells of large capacity drilled along Cow Creek, six miles from the town of Irvine and about the same distance from the shallow sand pool developed in the county ten years ago. Developments reached greatest importance during the year in the Cow Creek and Ravinna pools, operators venturing cautiously in the beginning and confining their activities closely to the sections which were better known. As wells of one hundred barrels' capacity became common a large number of new operators were gradually attracted. Leases in the proven territory being unavailable, the new comers reached out into other portions of the county and by the middle of the summer season wildcat operations had greatly extended the county's proven area. Results of operations toward the close of the year were apparent in the Miller Creek extension and the Station Camp pool. Completions along Miller Creek were hardly as productive as those found in other portions of the county, but the discovery of a deeper oil-bearing formation kept the trade pounding away, with the result that two distinct sands have been proven. Developments around Station Camp just began to be interesting toward the close of the year. Many wells of good capacity had been drilled, but it was not until the Cumberland Pipe Line Company extended a branch line into the field in December that operations on a large scale were started. At the present time the Station Camp pool gives promise of outdoing the older Cow Creek and Ravinna pools in the matter of production and extent of productive territory. The limits of the pool have been extended into the bordering county of Jackson, with further extensions probable. A large number of wells producing 100 barrels or better were drilled during November and December, many instances being known of wells paying for themselves within twenty-four hours after being drilled in.

Larger Completions in Estill for Year.

Among larger completions of the year in Estill county were:—

June.—Gains, Marcum & Nealy, 200 barrels; Root & Huff, 125 barrels; Williams, Hare & Nealy, 125 barrels.

July.—Wood Oil Company, 3 wells, 200 barrels each; C. J. Weidermann, 2 wells, 100 and 125 barrels; LeRoy Adams, 200 barrels; J. E. Thompson, 125 barrels, 100 barrels and 125 barrels; Wood Oil Company, 4 wells, 100 barrels each.

August.—New Domain Oil and Gas Company, 100 barrels; United Oil Company, 2 wells, 100 barrels each.

September.—United Oil Company, 100 barrels; Burnett Oil Company, 175 barrels; United Oil Company, 100 barrels.

October.—Wood Oil Company, 2 wells, 100 barrels each; United Oil Company, 2 wells, 100 barrels each; Ohio Fuel Oil Company, 150 barrels; Gains, Marcum & Nealy, 100 barrels.

November.—Wood Oil Company, 2 wells, 100 barrels each; Ohio Fuel Oil Company, 2 wells, 150 barrels each; Maple Oil Company, 150 barrels; Furnace Oil Company, 100 barrels.

December.—Eight wells at Station Camp, 100 to 150 barrels each.

Advance strike in Powell county, an extension of Estill county, in September, produced 150 barrels.

In Allen County.

Operations in Allen county, a district of Southern Kentucky remote from other proven fields or pipeline extensions, proceeded somewhat more slowly than in the more favorably situated field of Estill county, but there was a remarkable picking up in developments late in the year, following some important extensions of the productive area. Dusters appeared with discouraging frequency the earlier part of the year, the limits of production seemed to have been defined to include only a small pool known as the Rhoda production. In August the first of the large wells was drilled, indicating a western extension of two miles. A strike of 200 barrels was quickly followed by other tests, most of which were highly successful, and the resultant large new production brought the field into close rivalry with Estill county as a shallow sand district to be figured with. Results in Allen county during 1915 were negligible, only a few small producers being found. The 1916 new production of nearly 4,000 barrels daily placed the field second in yield among the twenty counties figuring in production.

The best well found in Allen county, or for that matter, in the State, was a 500-barrel producer drilled by the White Plains Oil Company on the Forst lease in July.

Other important strikes of the year were:—

July.—Ocala Oil Company, 200 barrels.

August.—White Plains Oil and Gas Company, two wells, 200 and 100 barrels.

September.—Gardner Oil Company, 75 barrels; Snowdon Bros., three wells, 150 barrels each.

October.—White Plains Oil and Gas Company, two wells, 300 barrels each.

November.—White Plains Oil and Gas Company, 100 barrels.

For the most part, the completions made in Allen county during the past year were of moderate size, ranging from 10 to 20 barrels. Wells of large capacity were the exception rather than the rule. For a market operators had to content themselves with tank car transportation. Much of the petroleum marketed went to Nashville, some to Louisville and a little to scattered points. Compared to what all the wells are capable of making the output of the county was slight, because of the inadequacy of the marketing arrangements. Most of the wells are now shut down, awaiting such time as a pipeline extension will be justified. Operators now have hopes of a pipeline north to Louisville, where the Standard Oil Company will erect a refinery during this or next year.

Decline of Wayne County.

Conditions with respect to the leading producing counties of the State were completely upset last year when the old Wayne county field suffered a decline and fell behind both Estill and Allen counties in completed work and new production. The total of 56 completions credited to Wayne county represented work undertaken wholly in defined lines, with the resultant very small producers. Twenty-seven dry holes represented tests in advance of production. For several years strikes of 50 and 100 barrels capacity were frequent in Wayne county, and for a long time the six defined pools turned out a greater amount of petroleum than all other districts combined. Some of the counties figuring in completed work for the year border Wayne county, and there is a probability of these districts being connected soon. Wayne county wells continue to figure largely in production, the staying qualities of the wells attracting operators even when producers of very small capacity seemed to be the only outcome of tests. Lately some new wells toward McCreary county, to the east, seem to prove an extension of some consequence, and it is along this line that future testing will be undertaken.

Deep sand districts, centered in Northeastern Kentucky, for the most part were inactive the greater part of the year. The remarkable performance of the shallow sand districts attracted the trade away from deep drilling. Wolfe county constituted the most active of the deep sand districts, with thirteen strikes and a new production of 132 barrels. Developments in this county were centered in the Stillwell section, about five miles apart from the old Campton district, the original producing district. None of the strikes exceeding 10 barrels, but as petroleum comes from the berea grit the old line companies pin their faith in a permanent yield. Lawrence county, bordering West Virginia, showed a larger number of completions than Wolfe county, a total of twenty-one being reported, but new production was smaller, averaging slightly under 5 barrels per well. Morgan county, another deep sand field, was almost lost sight of during the year, furnishing only seven completions, with a new yield of 30 barrels. Four drys were recorded.

A large number of wells were drilled in districts apart from pipelines, most of this advance work being started late in the year. In some sections results were especially encouraging, indicating that many districts away from pipelines are rich in petroleum resources.

In Southeastern Kentucky.

In Southeastern Kentucky a number of strikes were made in Knox and Whitley counties. One well near Williamsburg, Whitley county, produced 10 barrels. A completion in Knox county made 15 barrels. Powell county, regarded as a northern extension of the Estill fields, attracted more attention, perhaps, than any other district apart from the pipelines. Nearly forty wells were completed in that county during 1916, one-third of them being failures. New wells for the most part were drilled around Clay City, where a field of limited extent was proven. A few advance completions showed paying sand, and these will be followed up during the year. In efforts to extend Estill county production southward three dry holes were drilled in Jackson county. More encouraging results were encountered in Lee county, to the east, where out of four tests two were producers, making 20 barrels each. Some very light producers were found in Montgomery and Madison counties, the showing being hardly sufficient to start the drill moving at a lively rate.

Several counties in the Big Sandy River valley, bordering West Virginia, were subjected to some scattered tests. One good well was drilled in Floyd county and another in Martin county. Probably the largest gas well yet drilled in the State was found in Carter county, with a daily yield of 3,000,000 cubic feet. The trade has been searching for a number of years through the Big Sandy district for extensions of the West Virginia sands. The berea grit has been proven to extend over a wide area, but strikes in this formation have always been small, seldom making over 5 barrels, and hardly profitable under prices which prevailed prior to late last year. Now that prices warrant the development of wells of this size there is a tendency to increase developments, and the resultant activity may show some new pools of greater productiveness over the deep sand area.

Along the Tennessee Border.

Along the Tennessee border several counties far removed from production were considerably leased over during the year, and at the beginning of 1917 were showing a little activity. New wells starting in Cumberland, Rockcastle, Barren, Edmonson, Metcalf, Hart and other counties will be watched with interest. In all these counties scattered tests extending over ten years have shown occasional strikes.

Results in Tennessee were very discouraging until late in the year, when efforts of operators were rewarded by two good strikes in the lower end of Scott county. Completed work was confined entirely to Scott county, due south of the Wayne county fields of Kentucky. Earlier in the year test after test was made in the old Oneida pool without result, thirteen dry holes being drilled shortly ahead of production and five dry holes appearing in other directions. The limits of that pool were proven to be very narrow, and advance drilling turned toward the lower part of the county, with the result that in November two wells were drilled near Glen Mary, starting out at 40 barrels each. In the same pool what is regarded as the best well yet drilled in the Kentucky-Tennessee field came in the first week of the present year, attaining a flow of 800 barrels in eighteen hours.

The two 40-barrel producers had already put the trade to scurrying in all directions for leases, and the closing of the year showed a large amount of new work in inception. The new strike has brought operators flocking in by the score, and if the recent venture does not prove a fluke this portion of Scott county will rival any district of Kentucky in point of new work during the year to come.

Tennessee Petroleum Possibilities.

The Glen Mary pool of Scott county, the only district of Tennessee to figure in activity during last year, is about 20 miles south of the Kentucky border and 10 miles removed from the old Oneida pool, which two years ago was expected to restore Tennessee to the list of petroleum-producing States. Operators holding leases number close to forty, while drilling wells now aggregate half a dozen. Leasing operations have extended to half a dozen counties, but present tests are limited to the region along the Scott-Morgan border, on the south fork of Cumberland River. Later this year there will be many advance tests, counties in line with drilling operations including Scott, Morgan, Pickett, Fentriss and Overton. Owners of the producing wells are already figuring on a pipeline extension, which would not be a difficult undertaking southward from Wayne county. Tennessee petroleum possibilities are considered just as inviting as those of Kentucky, the only difference being that initial efforts were not rewarded with the same degree of success. Now that the beginning of a productive pool is indicated that State is figured to come to the front at a rapid rate.

Petroleum prices during the year fluctuated from $1.50 at the beginning of the year to $2.10 at the close, the latter quotation being the highest price ever quoted on Kentucky petroleum. Ragland petroleum, the product of Bath and Rowan counties, advanced from 72 cents to 95 cents during the year. The latter grade is of heavy specific gravity and its production has never attained large figures. The bulk of Kentucky's output was taken over by the Standard Oil Company through the Cumberland pipeline extensions, which connect the developed districts. Producers in Allen county marketed their output mostly in Nashville, Tenn., a price of $1.90 per barrel prevailing the greater part of the year. Tank car transportation provided the only method of getting Allen county petroleum to the market.

Cumberland Pipeline Extensions.

The Cumberland Pipeline Company, established twelve years ago, expended a large amount during the year in building additional lines in Kentucky and bettering its facilities for handling the rapidly growing output. Most of the additional expense was incurred in connecting up Estill county. A 4-inch line built to that county early in the year soon proved inadequate and two additional extensions have since been constructed, all connecting with the main trunk line in Wolfe county. Recently an extension of twenty miles was built through Miller Creek and Station Camp districts, new extensions of the Estill county field. A new pipeline from Wolfe county to the West Virginia border will probably be extended early this year to take care of the great increase in Kentucky's production. Extensions to the pumping plants at Campton, Wolfe county, have been completed. This is the main station for handling the State's yield of petroleum, branch lines extending south and north.

Since the great showing of Kentucky in production the past year and the possibility of Tennessee developing into an important producing State, a number of refinery plants have been inaugurated. Important among these is the proposed Standard Oil refinery

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at Louisville. The Standard Oil company of Kentucky has purchased sixty acres in that city as a site and expects to erect a large refinery during the year, or as soon as possible. When this refinery is erected most of this State's output will probably be refined at Louisville instead of in the East, as at present. The Melick Refining Company announces that a $2,000,000-refinery will be built at Lexington during the year. The Security Producing and Refining Company, composed of Estill county petroleum interests, proposes to build a refinery at Louisville. No petroleum has been refined in Kentucky since the dismantling of the county.

1916 REMARKABLE YEAR IN HISTORY OF KANSAS-OKLAHOMA PETROLEUM FIELDS

Of 81,154 Wells Drilled in Mid-Continent 43,417 Are Still Producing After 15 Years—Decline of Cushing Important Feature.

The year 1916 was a remarkable period in the history of the mid-continent field embracing Kansas and Oklahoma. It came in with prices inflated as never before as a result of the decline of Cushing and the rapidly increasing demand for gasoline. During the year there was a tremendous rush to the drill and there followed a flood of new production, resulting in a recession of prices from $1.55 a barrel to 90 cents a barrel. Then a halt was called in drilling and 700 fewer wells a month were drilled; consumption overtook production and the price toward the close of the year soared in spectacular fashion again, being at the time of this writing the highest in the history of the field, and apparently due to higher levels.

During the year 11,241 wells were drilled, exceeding the record of any previous year save 1913 when 11,494 wells were drilled. There has been a total of 81,154 wells drilled in the mid-continent down to January 1, 1917. Of this number 43,417 are still producing, indicating that 37,737 were either gas wells, dry or have since become exhausted. When it is considered this field has been producing for fifteen years or more this is a remarkable record, 53.5 per cent. of the total number of wells still drilling and only 46.5 per cent. gas, dry and exhausted. It is significant that in 1916, with the vast amount of wildcat drilling in all parts of Kansas and Oklahoma, 86.7 per cent. of all wells drilled were successful oil or gas producers. No wonder men take big chances when the margin is so small.

Cushing Declined to 90,000 Barrels a Day.

During the year Cushing dropped from its place of importance and its production, which, during the earlier part of the year had been increased to nearly 150,000 barrels again by reason of the development of the Shamrock end of the field, had declined to less than 90,000 barrels a day. In the meantime the Garber pool, near Enid, had been discovered and was being slowly developed, with strong indications of a rich field. During the year much of the decline at Cushing was made up at Bixby, Stone Bluff, Leonard, and Broken Arrow. Wells in this territory started off at from 300 to 2,000 barrels a day and the crude was of high gravity. It is impossible to predict what the coming year may bring forth in this district. Broken Arrow is still full of possibilities. Healdton in 1916 produced more oil than it could take care of and added to its reserve stocks. One of the pleasing features of Healdton is the fact that much better results are obtainable from that crude in the way of gasoline than was anticipated. There are big possibilities of larger production west and northwest of Healdton. In fact the hope of future production in the mid-continent field lies along a north and south line extending from west of Healdton to the northern part of Kansas and passing through Blackwell, Augusta and Eldorado. This territory has the earmarks that characterized the old field extending south from Paola, Chanute, Independence, Bartlesville, Tulsa, Okmulgee, etc. Of course there will probably be veerings the same as in the old field.

Work during the year was slow in the Blackwell field, but Blackwell has a future; it looks like a field that may be tied to. The "real show" of the year was Butler county with its Augusta and Eldorado pools. No one can tell what 1917 may develop in this district. It will not be surprising to see the field lap over into Nebraska and extend over into Missouri. Already some drilling is being projected in Missouri around Kansas City.

Production in 1916.

The total production of the mid-continent field in 1916 slightly exceeded that of 1915. The total yield in 1915, including both marketed and stored crude, aggregated 121,998,915 barrels; in 1916 it amounted to 122,671,767 barrels. We believe these figures are conservative.

The output of the year would have shown a decline had it not been for the surprising performance of Kansas. As nearly as can be ascertained the amount of oil produced in Kansas in 1916 was 11,530,487 barrels. This is arrived at by taking the amount of crude in storage, the average pipeline runs and the estimated amount of oil shipped to scattered consumers. The potential production of Kansas at the present time is approximately 100,000 barrels a day. The total yield of crude in Oklahoma in 1916 was 111,141,280 barrels, as against 117,883,115 barrels the previous year. Up to the present time the total production of the mid-continent field since its discovery has amounted to 762,174,158 barrels, of which 47,829,947 barrels are credited to Kansas and 714,344,211 barrels are credited to Oklahoma. The indications are that during the next few years Kansas will reduce the parity between the two States.

Runs for the Year.

The runs of the Prairie Oil and Gas Company from both Kansas and Oklahoma in 1916 reached 35,727,450 barrels. While this was over 3,000,000 barrels more than the total runs for 1915, the total was considerably short of the years 1913 and 1914 and only slightly exceeded the Prairie's runs in 1907 and 1911. Of the total 762,174,158 barrels produced in the mid-continent field today, 381,606,775 barrels have been marketed by the Prairie Oil and Gas Company.

The Gulf Pipeline runs in 1916 aggregated 10,028,000 barrels, making the total runs of that company since it entered the field in 1907 reach 77,059,264 barrels.

The Texas Company entered the field at the same time, and its total runs now aggregate 83,642,422. Its runs for 1916 were 21,618,262 barrels.

The Magnolia Petroleum Company came in for its full share of the business in 1916. The Magnolia has been operating in the mid-continent field only three years, and during that time it has marketed 12,849,996 barrels of crude, its runs in 1916 being placed at 6,992,906 barrels, or more than twice the amount of 1915.

Growth of Independent Refineries.

The independent refineries, according to reports made by the various companies, used a daily average of 138,815 barrels in 1916. All the refineries operating in the mid-continent field, except the Standard plants, the Magnolia and the Texas, are included in this figure, and which were not affected by the principal pipeline reports as indicated in the tables herewith shown. This means that the independent refineries in the mid-continent field in 1916 handled almost as much crude as the Prairie, the Gulf and the Texas companies combined, having increased their runs from 31,390,000 in 1916 to the grand total of 50,667,475 barrels in 1916. The estimated total amount of oil used by the independent refineries since they began doing business in this field has now reached 155,112,101 barrels.

It is estimated that tank car shipments not included in the above figures of deliveries to independent refineries or in the other pipeline reports aggregated approximately 3,000,000 barrels.

At the close of 1915 it was estimated there were 2,000,000 barrels of oil in storage in Healdton. At the close of 1916 there were 8,000,000 barrels, indicating that there were produced above the pipeline figures 6,000,000 barrels in 1916.

There is every indication that the independent refiners in the mid-continent field will materially increase their runs in 1917 if it is possible for them to secure crude. They have been very largely responsible for the prosperity of the field during the past year. They have gone out and sought their own market. They have created consumption. They have built modern, efficient refineries, and they have been compelled to pay heavy toll in the way of premiums above pipeline figures to the producers. If the producer would stop to reflect upon the importance of the independent refining industry to his prosperity, he would have more consideration for the independent refiner. Premiums now run all the way from 5 to 80 cents a barrel, according to the grade of the oil and its location and marketing facilities.

Stocks in 1915-1916.

At the close of 1915 it was estimated there were 94,519,631 barrels of oil in storage in the mid-continent field. At the close of 1916 this amount had been increased to 97,917,458 barrels. This shows a gain in 1916 over 1915 of 3,397,827 barrels, the gain practically being equal to the amount of oil put in storage in Butler county, Kansas, during the year. So that in the question of storage Oklahoma practically held its own in 1916, while Kansas made a gain.

On January 1, 1916, there were 47,249,730 barrels of crude in storage in the Cushing field, and at the close of that year this amount had been reduced to approximately 40,870,000 barrels. The daily production of Cushing at the close of 1915 was estimated at 97,135 barrels, and at the close of 1916 it was estimated at 94,000 barrels. At the close of 1915 there had been drilled a total of 2,766 wells in the Cushing district, but because of deepening, gas, dry, etc., the actual number of producing wells at that time was 1,295. The total number of wells drilled in the Cushing district to January 1, 1917, was 3,538.

Of the total amount of oil held in storage 86,152,771 barrels are credited to Oklahoma, although the Prairie's figures in this list include both its Kansas and Oklahoma stocks.

Present Field Production.

At the close of 1915 it was estimated the potential production of the mid-continent field was 327,168,000 barrels. At the close of 1916 a careful estimate of the output of the field indicated a potential production of 351,200 barrels a day.

Mid-Continent Output, 1916.

	Barrels.
Prairie Oil and Gas Company	35,727,450
Gulf Pipe Line Company	10,028,000
The Texas Company	21,618,262
Magnolia Petroleum Company	6,992,906
Independent refineries	50,667,475
Tank car shipments	3,000,000
Stored at Healdton in 1916	6,000,000
Stored in Kansas in 1916	3,764,687
Total, 1916	122,671,767
Total, 1916	137,822,940

Stocks, January 1, 1917.

	1916. Barrels.	1917. Barrels.
Prairie Oil and Gas Co.	43,445,484	40,032,935
Gulf Pipe Line Co.	7,800,000	5,800,000
Texas Company	8,202,335	7,701,031
Magnolia Petroleum Co.	1,021,547	4,510,005
Prairie Pipe Line Co.	.....	1,000,000
Carter Oil Co.	17,710,200	17,513,100
Standard Oil Co. of Ind.	4,262,000	3,750,000
Sinclair Oil & Gas Corp.	.....	1,385,400
Cosden & Co.	.....	1,065,700
Tidewater Oil Company	.....	1,118,000
Others in Oklahoma	10,080,665	2,276,600
Indepdents in Kansas	.....	3,764,687
Healdton	2,000,000	8,000,000
Totals	94,519,631	97,917,458
1916 gain over 1915	.....	3,397,827

Mid-Continent Reserve Stocks.

	Barrels.
Kansas, in steel tanks	3,764,687
Oklahoma, including Healdton	94,152,771
Total, January 1, 1917	97,917,458
Total, January 1, 1916	94,519,631
Total, January 1, 1915	76,129,031

Kansas Steel Storage Tanks.

Name of company.	Barrels.
Empire Gas and Fuel Co.	575,861
Sinclair Oil and Gas Co.	208,014
Slim Jim Oil Co.	600,000
McMan Oil Company	1,853,533
J. W. Gilliland	309,825
Freed Oil and Gas Company	110,160
Cosden Oil and Gas Company	1,500
Carter Oil Company	30,702
Mid-Kansas Oil Company	53,292
National Refining Company	1,800
Prairie Oil and Gas Co. (Butler Co.)	20,000
Total	3,764,687

Oklahoma Stocks.

Name of company.	Barrels.
Prairie Pipe Line Company	1,000,000
Prairie Oil and Gas Company	*40,032,935
Standard of Indiana	3,750,000
Carter Oil Company	17,513,100
Texas Company	7,701,031
Gulf Pipe Line Co. of Oklahoma	5,800,000
Tidewater Oil Company	1,118,000
Sapulpa Refining Company	54,600
Sinclair Oil and Gas Corporation	1,385,400
Cosden & Co.	1,065,700
Indiahoma Refining Company	121,000
Healdton stocks	9,000
Tierce Oil Corporation	872,000
Consumers' Refining Company	470,000
Roxana Petroleum Company	250,000
Silurian Oil Company	4,510,005
Magnolia Petroleum Company	500,000
Miscellaneous	86,152,771
Total	

*Includes Kansas storage outside of Butler county.

Cushing stocks (included above), January 1, 1917	40,870,000
Healdton stocks	8,000,000

Cushing stocks January 1, 1916, amounted to 47,249,370 barrels and on January 1, 1915, to 23,313,500 barrels.

Iron Storage Tanks.

PRAIRIE OIL AND GAS COMPANY, JANUARY 1, 1917.

	1910.	1912.	1914.	1916.	1917
Kansas	330	330	332	292	289
Oklahoma	781	857	850	970	937
Osage	20	14	21	11	5
Trunk lines	26	32	37	..	..
Prairie P. L. Co.	..	..	..	120	126
Totals	1,157	1,233	1,240	1,393	1,357

Kansas Production.

ENTIRE OUTPUT OF CRUDE TO JANUARY, 1917.

	Barrels.
Prior to pipe line	438,154
1900	68,564
1901	169,151
1902	295,209
1903	931,015
1904	4,236,336
1905	3,892,868
1906	3,075,571
1907	3,331,404
1908	2,473,107
1909	1,032,117
1910	1,129,313
1911	2,907,150
1912	2,182,042
1913	2,171,659
1914	3,850,000
1915	4,115,800
1916	11,530,487
Total	47,829,947

Oklahoma Production.

ENTIRE OUTPUT OF CRUDE UP TO JANUARY 1, 1917.

	Barrels.
Prior to 1900	4,225
1900	6,150
1901	10,000
1902	36,540
1903	140,000
1904	1,366,700
1905	8,561,950
1906	18,618,583
1907	42,830,250
1908	45,801,675
1909	46,975,150
1910	52,500,000
1911	56,425,700
1912	51,425,430
1913	63,575,200
1914	97,242,263
1915	117,883,115
1916	111,141,280
Total	714,344,211

Total Mid-Continent Production by Years.

	Barrels.
Prior to pipeline, 1899	442,379
1900	74,714
1901	179,151
1902	331,749
1903	1,071,015
1904	5,603,036
1905	12,454,818
1906	21,649,154
1907	46,161,554
1908	48,274,782
1909	48,007,267
1910	53,429,313
1911	59,332,850
1912	53,607,472
1913	65,746,859
1914	101,092,263
1915	121,998,915
1916	122,671,767
Total	762,174,158

Estimated Production of Fields by Districts, January 1, 1917.

	Barrels, Daily.
Kansas, outside Augusta and Eldorado	17,000
Augusta-Eldorado	80,000
Cherokee deep sand	31,000
Cherokee shallow sand	12,700
Creek, outside Cushing	68,000
Cushing	94,000
Osage	35,000
Cleveland, Newkirk, Blackwell, Ponca	13,500
Total, January 1, 1917	351,200
Total, January 1, 1916	327,168

Crude Market Fluctuations, Five Years.

MID-CONTINENT FIELD.

1912.	
January 2	$0.53
January 15	.55
January 25	.57
February 5	.60
April 10	.62
April 16	.64
May 7	.66
May 17	.68
July 16	.70
November 3	.73
November 27	.76
December 11	.78
December 16	.80
December 24	.83
1913.	
January 27	.86
January 29	.88
July 7	.93
July 21	.98
August 19	1.03
1914.	
February 2	1.05
April 8	1.00
April 10	.95
April 13	.90
April 15	.85
April 27	.80
April 29	.75
September 22	.65
October 1	.55
1915.	
February 8	.45
February 15	.40
August 2	.50
August 4	.55
August 11	.60
August 19	.65
August 21	.75
September 11	.80
November 13	.90
November 15	1.00
December 13	1.10
December 14	1.20
1916.	
January 20	1.25
January 26	1.30
March 4	1.40
March 11	1.45
March 14	1.55
July 24	1.45
July 29	1.35
August 1	1.25
August 7	1.15
August 12	1.05
August 15	.95
August 26	.90
November 29	1.00
December 12	1.10
December 18	1.20
December 23	1.30
December 28	1.40

Healdton Prices, Two Years.

1915.	
January 1	$0.50
February 8	.30
September 24	.35
October 11	.40
October 25	.45
November 15	.55
December 14	.60
1916.	
January 7	.65
January 21	.70
January 27	.75
March 14	.80
July 25	.70
July 31	.60
August 2	.50
August 14	.45
August 16	.40
November 29	.45
December 13	.50
December 19	.60
December 23	.70
December 29	.75

Tank Wagon Prices Prevailing in Kansas City.

Date.	Standard Oil Co. Kerosene, cents.	Standard Oil Co. Gasoline, cents.
1914.		
February 6	6.5	14.0
February 9	6.5	13.5
April 1	6.5	13.0
April 16	6.5	12.5
April 27	6.0	12.5
May 11	6.0	12.0
June 17	5.3	10.8
July 27	5.3	10.5
September 29	5.3	10.3
December 22	4.8	10.3
1915.		
February 22	4.8	9.8
April 12	4.3	9.8
June 10	4.3	8.8
August 30	4.8	8.8
September 1	4.8	8.8
September 15	4.8	9.8
September 21	4.8	9.8
September 29	5.3	10.8
October 21	5.3	10.8
October 25	5.8	11.8
November 2	5.8	11.8
November 15	5.8	12.8
November 17	5.8	12.8
November 22	6.3	13.8
November 30	6.3	14.8
December 13	6.3	14.8
December 21	6.3	14.8
December 30	6.3	15.8
1916.		
January 27	6.3	16.8
March 7	6.3	17.8
March 18	6.8	17.8
July 3	6.3	17.8
August 16	6.3	16.8
August 21	5.8	16.8
September 7	5.8	15.8
October 10	5.3	14.8
December 6	5.8	15.8
December 18	5.8	16.8

Pipe Line Runs by Years.

PRAIRIE OIL AND GAS COMPANY.

	Barrels.
Prior to pipe line, 1899	442,379
1900	74,714
1901	174,151
1902	331,749
1903	1,071,015
1904	5,603,036
1905	11,854,818
1906	21,194,154
1907	35,610,340
1908	33,266,282
1909	28,773,727
1910	31,587,313
1911	34,671,780
1912	30,870,200
1913	38,720,242
1914	40,368,859
1915	31,261,566
1916	35,727,450
Total	381,606,775

The Union Sulphur Co.

Producers of the High Grade Brimstone

Average Analysis:

Sulphur - - - - 99½ per cent.

Organic Matter - - ½ per cent.

Free from Arsenic or Selenium

Mines: Calcasieu Parish, Louisiana

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1864 1917

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GULF PIPE LINE COMPANY.

	Barrels.
1907	5,424,569
1908	5,638,300
1909	6,728,490
1910	7,941,500
1911	8,218,700
1912	7,514,000
1913	7,590,800
1914	8,097,905
1915	9,877,000
1916	10,028,000
Total	77,059,264

THE TEXAS COMPANY.

	Barrels.
1907	3,484,245
1908	5,371,000
1909	7,329,500
1910	7,513,000
1911	8,047,370
1912	6,830,766
1913	7,013,167
1914	7,587,593
1915	8,846,519
1916	21,618,262
Total	83,642,422

Magnolia Petroleum Company.

	Barrels.
1914	2,669,150
1915	3,187,940
1916	6,972,906
Total	12,849,996

INDEPENDENT REFINERS.

	Barrels.
Prior to 1906	600,000
1906	500,000
1907	1,642,500
1908	3,099,200
1909	5,175,550
1910	6,387,500
1911	8,395,000
1912	8,392,500
1913	12,442,650
1914	25,539,720
1915	31,390,000
1916	50,667,475
Total	155,112,101

Runs, Deliveries, Stocks, 1916.

PRAIRIE OIL AND GAS COMPANY.
(Prairie Pipe Line Company.)

RUNS.

1916.	Barrels.	Daily Average, Barrels.
January	2,945,000	95,000
February	2,755,000	95,000
March	2,976,000	96,000
April	2,926,500	97,550
May	3,100,000	100,000
June	3,150,000	105,000
July	2,418,000	78,000
August	2,431,950	79,031
September	3,000,000	100,000
October	3,255,000	105,000
November	3,360,000	112,000
December	3,410,000	110,000
Totals, 1916	35,727,450	91,882
Total, 1915	31,261,566	.....
Total, 1914	40,366,859	.....
Total, 1913	38,720,242	.....
Total, 1912	30,870,206	.....
Total, 1911	34,671,780	.....
Total, 1910	31,587,313	.....
Total, 1909	28,775,727	.....

DELIVERIES.

1916.	Barrels.	Daily Average, Barrels.
January	3,818,226	123,136
February	3,265,362	112,599
March	3,382,694	109,119
April	3,422,450	114,082
May	3,503,737	113,024
June	3,653,549	117,856
July	3,689,128	119,004
August	3,699,973	123,332
September	3,802,039	125,550
October	3,691,269	123,042
November	4,056,980	130,870
Totals, 1916	43,646,952	119,222
Total, 1915	43,990,124	.....
Total, 1914	39,268,293	.....
Total, 1913	34,850,073	.....
Total, 1912	33,668,504	.....
Total, 1911	33,621,305	.....
Total, 1910	31,961,188	.....
Total, 1909	26,856,723	.....

STOCKS.

1916.	Barrels.
January	43,000,000
February	42,000,000
March	41,250,000
April	42,300,000
May	41,100,000
June	42,200,000
July	42,350,000
August	40,200,000
September	40,200,000
October	40,000,000
November	40,500,000
December	40,032,935

GULF PIPE LINE COMPANY.

RUNS.

		Daily Average,
January	744,000	24,000
February	783,000	27,000
March	868,000	28,000
April	816,000	27,200
May	914,500	29,500
June	1,050,000	35,000
July	1,054,000	34,000
August	992,000	32,000
September	930,000	30,000
October	537,000	17,323
November	720,000	24,000
December	620,000	20,000
Totals, 1916	10,028,500	27,335
Total, 1915	9,877,000	.....
Total, 1914	8,097,905	.....
Total, 1913	7,590,800	.....
Total, 1912	7,514,000	.....
Total, 1911	8,218,700	.....
Total, 1910	7,941,500	.....
Total, 1909	6,728,490	.....

DELIVERIES.

1916.	Barrels.	Daily Average, Barrels.
January	744,000	24,000
February	696,003	24,000
March	790,500	25,500
April	813,000	27,100
May	868,000	28,000
June	870,000	29,000
July	899,000	29,000
August	883,500	28,500
September	840,000	28,000
October	930,000	30,000
November	780,000	26,000
December	720,000	24,000
Totals, 1916	9,834,000	26,925
Total, 1915	9,035,500	.....
Total, 1914	7,270,401	.....
Total, 1913	7,591,100	.....
Total, 1912	7,508,700	.....
Total, 1911	7,680,900	.....
Total, 1910	7,941,500	.....
Total, 1909	6,187,060	.....

STOCKS.

1916.	Barrels.
January	6,338,000
February	6,500,000
March	6,577,000
April	6,000,000
May	4,750,000
June	4,950,000
July	5,105,000
August	5,336,500
September	5,426,500
October	5,333,958
November	5,393,500
December	5,800,000

RUNS.

1916.	Barrels.
January	1,791,602
February	1,996,584
March	2,057,136
April	1,941,678
May	2,128,791
June	1,846,001
July	1,671,242
August	1,631,939
September	1,648,248
October	1,722,659
November	1,569,619
December	1,612,872
Total	21,618,262

DELIVERIES.

1916.	Barrels.
January	2,337,852
February	2,178,561
March	1,995,056
April	1,778,137
May	2,090,196
June	2,179,236
July	2,446,545
August	2,617,952
September	2,254,668
October	2,065,236
November	2,538,449
December	2,186,766
Total	26,638,654

STOCKS.

1916.	Barrels.
January	8,204,836
February	8,454,013
March	8,564,150
April	8,577,356
May	8,523,418
June	8,598,986
July	8,690,969
August	8,574,613
September	8,485,308
October	8,251,888
November	7,995,602
December	7,701,661

Total	
Trunk mileage pipeline owned, miles	1,776
Telegraph and telephone lines, miles	5,000
Employes	10,000

MAGNOLIA PETROLEUM COMPANY.
(Healdton, Cushing and Yale.)

RUNS.

1916.	Barrels.	Daily Average, Barrels.
January 1, 1916	538,184	17,360
February	597,558	20,905
March	783,896	25,287
April	757,676	25,226
May	603,855	19,479
June	526,355	17,545
July	463,563	14,954
August	477,517	15,413
September	469,970	15,666
October	651,467	21,015
November	619,163	20,639
December	503,422	16,239
Totals, 1916	6,992,906	19,117
Total, 1915	3,187,940	.....
Total, 1914	2,669,150	.....

DELIVERIES.

1916.	Barrels.	Daily Average, Barrels.
January 1, 1916	538,204	17,940
February	851,632	30,408
March	848,189	27,361
April	810,282	27,009
May	708,768	22,864
June	612,963	20,432
July	612,563	19,760
August	470,969	15,193
September	450,918	14,364
October	726,992	23,258
November	642,205	21,407
December	612,333	19,753
Totals, 1916	7,490,018	20,496

STOCKS.

1916.	Barrels.
January	1,373,612
February	1,503,885
March	1,472,703
April	1,409,570
May	1,373,516
June	1,301,524
July	4,025,040
August	4,027,726
September	4,071,194
October	3,978,228
November	4,572,147
December	4,510,005

MAGNOLIA PETROLEUM COMPANY.
(Mid-Continent and Gulf.)

RUNS.

1916.	Barrels.	Daily Average, Barrels.
January	825,018	26,613
February	861,286	29,699
March	1,059,703	34,184
April	1,036,116	34,537
May	924,490	29,822
June	868,786	29,626
July	817,848	26,382
August	799,125	25,778
September	763,459	25,448
October	954,411	30,787
November	938,603	31,287
December	806,459	26,015
Totals, 1916	11,675,293	29,182
Total, 1915	3,187,940	.....
Total, 1914	2,669,150	.....

DELIVERIES.

1916.	Barrels.	Daily Average, Barrels.
January	1,481,060	47,773
February	1,302,875	44,927
March	1,662,150	53,618
April	1,536,329	51,211
May	1,507,261	48,621
June	1,597,376	53,246
July	1,812,624	58,472
August	1,768,059	57,034
September	1,664,435	55,145
October	1,635,902	54,530
November	1,339,184	44,640
December	1,266,356	42,141
Totals, 1916	18,473,647	50,607

STOCKS.

1916.	Barrels.
January 1	3,620,561
February 1	3,863,221
March 1	3,985,549
April 1	3,943,864
May 1	4,073,713
June 1	3,943,920
July 1	3,847,998
August 1	6,202,414
September 1	5,907,444
October 1	5,527,536
November 1	5,257,876
December 1	5,890,416
January 1, 1917	5,773,825

Mid-Continent Field Operations, 1916.

More wells were drilled in the mid-continent field in 1916 than in any previous year, except 1913 when there were 11,494 completions. In 1916 there were 11,241 wells drilled; of this number 7,601 were in Oklahoma and 3,640 were in Kansas. The year 1913 was the banner twelve-month in Oklahoma. In that year 9,314 wells were drilled. It will not be surprising if the next year or two finds Kansas and Oklahoma on a more equal basis so far as completions and production are concerned. Kansas is coming to the front rapidly.

In many respects 1916 was a spectacular year in field development in the mid-continent region. The price of crude early in the year advanced to $1.55 a barrel. There was a tremendous rush to the drill. The south end of the Cushing pool was developed and the output of that famous district was increased from about 70,000 barrels a day to nearly 150,000 barrels a day. The remarkable development at Eldorado and Augusta in Butler county, Kansas, started in the spring of this year and grew with amazing rapidity. So that by early summer it became evident another over-production was fast approaching.

Cut in Runs Because of Over-Supply

On July 8 the Prairie Oil and Gas Company announced that because of surplus of crude, it would run only 75 per cent. of the production of the field. Again on July 15 the Prairie Oil and Gas Company announced that it would run only 60 per cent. of the production of the field. On July 24 the market was reduced from $1.55 a barrel to $1.45 and continued to drop until it reached 90c. on August 26. On July 28 the Prairie Oil and Gas Company reduced its runs to 50 per cent. of the production. The number of wells drilled per month dropped from 1,430 in May to 590 in December, these being the extremes of the year, the former being the largest number of completions in any single month in the history of the mid-continent region. The sudden discontinuance of the drill brought a quick reaction and by November it was again evident demand had overtaken supply.

There was a time when the Prairie Oil and Gas Company was practically the only purchaser of crude petroleum in the mid-continent field. Today it is one of many. There was a time when it made, without question, the market. Today there is a question whether the Prairie makes the market or whether it simply reflects that which others bring about. The inability of the Prairie to buy enough oil to meet its requirements caused that company on November 29 to advance the price from 90c. to $1, and on December 28 the crude market had jumped to $1.40 a barrel, or thus during the year, as the result of the rapid changes in field conditions, the market price of crude moved from $1.25 at the opening of the year to $1.55, receded to 90c., and again advanced to $1.40. Nothing approaching this spectacular seesaw had ever before been witnessed in the mid-continent region. There is every reason to believe that the market changes in the future in the mid-continent field will come oftener and with wider range than in the past. This will be due to several causes:—

First—The tremendous demand for gasoline.

Second—The increasing number of large and powerful financial interests; and

Third—The ability to find new, rich pools in the great plains region of the mid-continent.

Big Increase of Wells in 1917 Predicted.

It is a pretty safe prediction that before 1917 is far advanced there will be such an increase in the number of wells drilled, that another over-production will be brought about to cause the market to again recede.

It may be observed that every year there has been a period in which the independent refiner has been able to buy his crude at a satisfactory market to tide over the period of inflated prices.

At the close of 1916 attention was riveted on Butler county, Kansas, in the north and the Garber field in Garfield county, Oklahoma. Men were wild with excitement. Money was being spent in a most spectacular fashion for oil properties. Fortunes were being paid for leases upon which not a drop of oil had been produced. A well started out in the wilderness, miles from any production, caused men to pay $50,000 and $75,000 for a lease on a quarter section of land. When such prices as these are paid, it is a pretty sure indication that test holes will be drilled immediately. There was a time in the mid-continent field if a test well were started, the owners of all surrounding leases would sit idly by until the original test was completed. Today if a test is started in Butler county, almost immediately offsets will be started without waiting for the completion of the original well.

It is interesting, in connection with the fabulous fortunes that are being paid for leases and producing properties in the mid-continent field, to observe that of the 81,154 wells drilled since the beginning of operations in this territory, there are now 43,417 producing oil, indicating that 37,737 wells, or almost 50 per cent., were either gas, dry, or have become exhausted.

Average Production Only 8 Barrels Per Day.

It is also interesting to note that the average production of these producing wells, including all the big gushers of the day, is only about eight barrels a day. The oldest producin wells in the field are only about fifteen years old. The average production of all wells over one year old in the mid-continent field is probably not over three barrels. Taking this into consideration, one is amazed when one hears of twelve, fifteen and thirty-five million dollars being paid for producing properties.

In the beginning of 1916 there were 3,848 producing wells in Kansas. At the close of 1916 there were 5,476 producing wells in Kansas connected to the Priarie's lines. This shows the rapidity with which the Kansas division of the field has advanced during the past year, and it must be taken into consideration that a very large per cent. of the big wells drilled in Kansas the past year has not been connected to the Prairie's lines, or, for that matter, to any other pipeline. In three years, or from January 1, 1914, to January 1, 1917, the number of producing wells in the mid-continent region has increased from 20,256 to 43,417, and graphically tells the story of the wonderful development of this remarkable oil field.

9,274 of 11,241 Wells Successful.

Of the 11,241 wells drilled in the mid-continent field in 1916, 9,274 were successful oil wells, 476 were gas wells and 1,491 were failures. This was the largest number of producing wells ever drilled in a single year in the mid-continent field. There were fewer gas wells drilled than in any other year since 1908. The total production of the successful oil wells was estimated at 674,731 barrels on a thirty-day basis and was the lowest of any year since 1913. It is significant that last year the largest number of successful oil wells in the history of the field were drilled and that the actual yield of the field was the largest in its history, while the potential production was the smallest in three years.

Summary of Mid-Continent Field Operations in 1916.

Wells Drilled by Years.
MID-CONTINENT FIELD.

Year.	Number Drilled.
1903 and before	1,590
1904	3,557
1905	4,023
1906	3,876
1907	4,720
1908	3,494
1909	3,850
1910	4,956
1911	4,956
1912	6,996
1913	11,494
1914	10,653
1915	5,848
1916	11,241
Total	81,154

Wells Drilled in 1916.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	798	672	40	86	78,780
February	796	616	40	111	47,525
March	1,031	819	52	160	45,380
April	1,160	930	40	190	47,096
May	1,430	1,174	51	205	69,080
June	1,289	1,114	28	149	89,740
July	1,195	1,070	28	93	60,964
August	990	786	39	135	53,346
September	756	601	40	115	53,146
October	628	488	42	98	58,298
November	630	525	27	78	36,956
December	590	477	42	71	33,420
Totals, 1916	11,241	9,274	476	1,491	674,731
Totals, 1915	5,848	4,114	731	1,003	796,634
Totals, 1914	10,653	8,216	839	1,598	904,951
Totals, 1913	11,494	8,857	1,008	1,629	293,085
Totals, 1912	6,996	5,256	745	995	224,436
Totals, 1911	4,956	3,653	577	731	177,656
Totals, 1910	4,856	3,710	488	658	182,280

Wells Drilled by Districts the Last Four Years.

	1913.	1914.	1915.	1916.
Kansas	2,180	2,394	1,123	3,640
Cherokee D.	3,314	1,805	488	1,288
Cherokee S. S.	1,339	1,460	406	1,213
Osage	651	577	204	280
Cleveland	286	113	75	196
Creek	2,646	2,835	1,770	3,753
Kay County	62	114	35	54
Healdton	...	...	451	686
Miscellaneous	132	587	81	132
Totals	11,493	10,653	5,848	11,241

Wells Drilled in the Two States.

Year.	No. of Wells Drilled in Kansas.	No. of Wells Drilled in Oklahoma.
1905	488	2,535
1906	730	3,146
1907	486	4,234
1908	473	3,021
1909	510	3,340
1910	480	4,370
1911	511	4,445
1912	1,012	5,982
1913	2,180	9,314
1914	2,394	8,259
1915	1,123	4,725
1916	3,640	7,601

Number of Wells on Prairie Pipe Line, January 1, 1916.

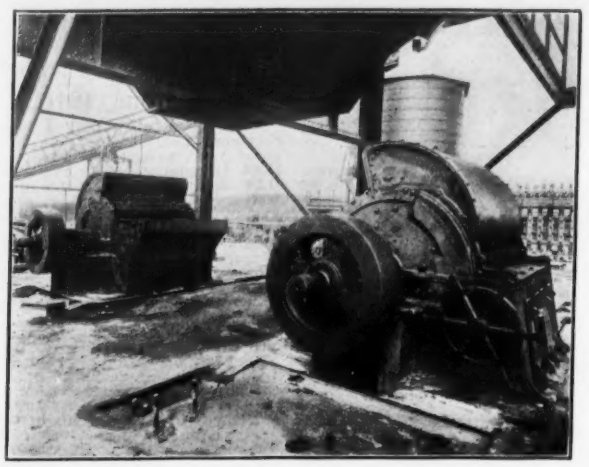
	1912.	1914.	1916.	1917.
Kansas	1,531	2,593	3,848	5,476
Osage	1,293	1,975	1,988	2,442
Cherokee deep	3,734	6,665	6,736	7,879
Cherokee shallow	5,288	3,543	6,885	6,475
Creek	1,690	2,324	3,587	2,952
Cleveland	281	540	607	528
Ponca City	...	...	45	39
Outlying	...	N4	79	96
Totals	13,127	17,657	23,775	25,887
On other lines	7,129	13,470	13,568	17,530
Total prod. wells	20,256	31,133	37,343	43,417
Gas, dry or exhausted	14,666	21,279	32,570	37,737
Grand totals	34,922	53,412	69,913	81,154

Oklahoma.

Total Wells Drilled.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	642	532	31	79	75,749
February	586	455	53	95	51,163
March	737	565	37	135	40,180
April	808	633	32	143	38,336
May	950	754	37	159	56,485
June	801	679	17	105	76,240
July	759	604	18	77	51,300
August	650	528	20	92	50,486
September	468	363	30	75	24,978
October	451	342	38	71	29,178
November	352	280	23	49	20,195
December	397	300	31	60	21,098
Totals, 1916	7,601	6,107	390	1,134	597,391
Totals, 1915	4,725	3,474	387	864	785,696
Totals, 1914	8,256	6,389	534	1,326	976,915
Totals, 1913	9,314	7,341	643	1,330	272,930
Totals, 1912	5,982	4,718	444	820	213,217

CRUSHERS
GRANULATORS
GRINDERS
PULVERIZERS



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Successful Oil Wells, 1916.

1916.	Chero. D. S.	Chero. S. S.	Osage.	Cleve- land	Cush- ing.	Creek.	Kay.	Heald- ton.	Misc.- Wild Cat.	Total.
January	68	158	18	2	47	167	6	64	2	532
February	65	107	18	4	51	647	1	64	1	458
March	110	83	19	18	37	200	7	92	3	569
April	171	115	24	20	47	170	5	74	3	629
May	189	140	17	23	65	220	4	85	11	754
June	148	138	10	21	77	201	2	65	12	674
July	113	156	15	13	72	198	1	96	2	664
August	93	85	19	10	61	220	2	34	2	528
September	46	50	25	10	42	165	1	23	3	365
October	15	12	16	11	100	153	1	29	3	340
November	37	33	12	4	37	142	1	19	1	286
December	30	24	34	3	56	132	1	18	10	308
Totals, 1916	1,087	1,101	225	139	692	2,115	32	663	53	6,107
Totals, 1915	341	520	145	51	944	1,127	16	315	15	3,474
Totals, 1914	1,343	1,375	433	79	679	2,018	56	400	16	6,399

Dry Holes, 1916.

1916.	Chero. D. S.	Chero. S. S.	Osage.	Cleve- land.	Cush- ing.	Creek.	Kay.	Heald- ton.	Misc.- Wild Cat.	Total.
January	10	5	0	3	0	54	0	3	4	79
February	15	7	0	3	0	55	0	3	2	97
March	18	16	0	3	6	82	2	3	3	133
April	30	9	1	6	4	84	1	1	5	141
May	23	22	4	4	2	82	0	0	20	199
June	12	0	3	7	2	74	0	4	3	105
July	4	10	1	2	7	50	1	2	1	78
August	15	6	6	3	0	58	2	0	2	92
September	8	3	1	3	4	47	1	1	7	75
October	8	8	2	8	3	30	0	0	3	71
November	3	4	3	3	1	27	0	0	2	43
December	2	3	1	0	3	46	2	0	0	60
Totals, 1916	148	93	28	45	38	698	9	19	56	1,133
Totals, 1915	72	57	33	22	53	484	8	90	40	864
Totals, 1914	238	77	98	27	53	653	52	116	12	1,326

Gas Wells, 1916.

1916.	Chero. D. S.	Chero. S. S.	Osage.	Cleve- land	Cush- ing.	Creek.	Kay.	Heald- ton.	Misc.- Wild Cat.	Total.
January	6	1	0	3	0	16	0	1	4	31
February	5	4	2	1	3	17	0	1	3	36
March	10	2	0	2	2	14	1	1	2	34
April	6	2	0	0	2	23	0	0	1	34
May	11	2	1	0	3	16	0	1	3	37
June	1	2	0	0	2	15	0	0	0	20
July	2	0	2	1	3	8	1	0	0	17
August	4	1	3	1	7	10	3	0	1	30
September	3	0	5	2	2	11	0	0	7	30
October	1	3	4	..	..	..	..	..	1	40
November	2	2	7	0	2	9	0	0	1	23
December	2	0	3	0	3	12	8	0	1	29
Totals, 1916	53	19	27	11	42	168	13	4	24	361
Totals, 1914	224	8	46	2	19	159	11	46	20	387
Totals, 1915	75	29	26	7	36	164	6	41	2	534

Estimated New Prodution, 1916.

1916.	Chero. D. S.	Chero. S. S.	Osage.	Cleve- land.	Cush- ing.	Creek.	Kay.	Heald- ton.	Misc.- Wild C.	Total.
January	1,585	1,850	1,350	30	49,800	10,340	380	10,360	45	75,740
February	1,430	1,219	1,020	253	19,361	14,104	450	5,191	75	43,103
March	1,710	809	810	675	10,010	12,223	674	13,249	20	40,180
April	2,544	1,490	530	450	6,500	17,496	610	8,686	30	38,336
May	2,400	2,100	2,120	600	22,615	14,601	695	10,751	603	56,485
June	2,068	1,430	475	773	10,920	13,410	50	10,929	529	76,240
July	1,655	1,979	3,350	500	22,995	13,085	450	7,296	20	51,300
August	1,675	1,110	2,111	200	16,010	7,598	85	1,737	210	30,468
September	805	766	2,150	1,275	7,845	8,250	500	2,975	340	24,978
October	515	280	1,900	285	13,250	9,705	450	2,463	300	29,178
November	600	580	955	130	7,615	7,900	150	2,045	220	20,195
December	555	300	1,910	195	7,820	7,221	600	1,957	420	21,098
Totals, 1916	17,002	14,036	18,681	5,516	230,316	135,942	5,124	77,272	2,812	507,301
Totals, 1915	5,753	7,723	11,725	1,100	633,970	62,350	1,065	64,390	570	788,696
Totals, 1914	18,829	15,210	28,032	4,058	667,146	124,123	5,308	111,890	318	976,915

Districts, Wells Drilled in 1916.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
Cherokee D.S.	1,288	1,087	53	148	17,602
Cherokee S.S.	1,213	1,101	19	93	14,036
Osage	280	225	27	28	18,681
Cleveland	195	139	11	45	5,516
Cushing	772	692	42	38	230,316
Creek	2,081	2,115	168	698	135,942
Healdton	686	663	4	19	77,272
Kay	54	32	13	9	5,124
Wildcats	132	53	24	55	2,812
Totals, 1916.	7,601	6,107	361	1,133	507,301
Totals, 1915..	4,725	3,474	387	864	788,696
Totals, 1914..	8,259	6,390	534	1,326	976,915
Totals, 1913..	9,314	7,341	643	1,350	272,935
Totals, 1912..	5,928	4,718	444	820	213,217

Cherokee Deep Sand.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	84	68	6	10	1,585
February	85	65	5	15	1,430
March	138	110	10	18	1,710
April	207	171	6	30	2,544
May	223	189	11	23	2,400
June	161	148	1	12	2,068
July	119	113	2	4	1,655
August	114	95	4	15	1,675
September	..	..	..	..	865
October	24	15	1	8	515
November	42	37	2	3	600
December	34	30	2	2	555
Totals—					
1916	1,288	1,087	53	148	17,602
1915	488	341	75	72	5,743
1914	1,805	1,343	224	238	18,829
1913	3,314	2,782	238	294	56,713
1912	2,836	2,395	195	246	82,639

Cherokee Shallow Sand.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	164	158	1	5	1,850
February	118	107	4	7	1,219
March	101	83	2	16	800
April	126	115	2	9	1,490
May	164	140	2	22	2,160
June	140	138	2	..	1,430
July	166	156	..	10	1,979
August	92	85	1	6	1,110
September	53	50	..	3	769
October	23	12	3	8	280
November	39	33	2	4	580
December	27	24	..	3	360
Totals—					
1916	1,213	1,101	19	93	14,036
1915	606	520	29	57	1,723
1914	1,460	1,375	8	77	15,210
1913	1,339	1,149	34	156	14,165
1912	935	773	44	118	16,014

Osage.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	18	18	..	..	1,350
February	26	18	2	6	1,020
March	19	19	..	..	810
April	25	24	..	1	630
May	22	17	1	4	2,120
June	13	10	..	3	475
July	16	13	2	1	3,350
August	28	19	3	6	2,111
September	31	25	5	1	2,150
October	22	16	4	2	1,900
November	22	12	7	3	955
December	38	34	3	1	1,910
Totals—					
1916	280	225	27	28	18,681
1915	204	145	26	33	11,725
1914	577	433	46	98	28,032
1913	651	525	58	68	26,610
1912	492	411	20	61	24,755

Cleveland.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	8	2	3	3	30
February	9	4	1	3	253
March	23	18	2	3	675
April	26	20	..	6	450
May	27	23	..	4	600
June	28	21	..	7	773
July	16	13	1	2	560
August	14	10	1	3	290
September	15	10	2	3	1,275
October	20	11	1	8	285
November	7	4	..	3	130
December	3	3	..	..	195
Totals—					
1916	195	139	11	45	5,516
1915	75	51	2	22	1,160
1914	113	79	7	27	4,058
1913	286	201	15	79	13,010
1912	283	224	11	48	23,386

Cushing.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	47	47	..	..	49,800
February	60	51	3	6	19,361
March	45	37	2	6	10,010
April	53	47	2	4	6,500
May	70	65	3	2	22,615
June	81	77	2	2	46,585
July	82	72	3	7	22,995
August	68	61	7	..	16,010
September	48	42	2	4	7,845
October	116	100	13	3	13,250
November	40	37	2	1	7,615
December	62	56	3	3	7,820
Totals—					
1916	772	692	42	38	230,316
1915	1,015	944	19	52	633,970
1914	768	679	36	53	667,146
1913	883	770	65	48	83,493
1912	100	79	12	9	10,665

Creek.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	237	167	16	54	10,340
February	219	147	17	55	14,104
March	296	209	14	82	12,223
April	277	170	23	84	17,496
May	318	220	16	82	14,601
June	290	201	15	74	13,410
July	256	198	8	50	13,085
August	288	220	10	58	7,598
September	223	165	11	47	8,250
October	209	153	17	39	9,705
November	178	142	9	27	7,900
December	190	132	12	46	7,221
Totals—					
1916	2,981	2,115	168	698	135,942
1915	1,770	1,127	159	484	62,350
1914	2,835	2,018	164	653	124,123
1913	2,646	1,839	202	605	75,689
1912	1,346	875	150	321	62,593

Kay.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	6	6	..	..	380
February	1	1	..	..	450
March	10	7	1	2	674
April	6	5	..	1	610
May	4	4	..	..	635
June	2	2	..	..	50
July	3	1	1	1	450
August	7	2	3	2	85
September	2	1	..	1	500
October	1	1	..	..	480
November	1	1	..	..	150
December	11	1	8	2	660
Totals—					
1916	54	32	13	9	5,124
1915	35	16	11	8	1,065
1914	114	56	6	52	5,308
1913	62	35	5	22	2,549
1912	87	40	22	25	3,830

Healdton.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	68	64	1	3	10,360
February	68	64	1	3	5,191
March	96	92	1	3	13,249
April	75	74	..	1	8,686
May	88	85	1	2	10,751
June	69	65	..	4	10,920
July	98	96	..	2	7,296
August	34	34	..	..	1,379
September	24	23	..	1	2,975
October	29	29	..	..	2,463
November	19	19	..	..	2,045
December	18	18	..	..	1,957
Totals—					
1916	686	663	4	19	77,272
1915	451	315	46	90	64,390
1914	557	400	41	116	111,890

Oklahoma Wildcats.

	Comp.	Oil.	Gas.	Dry.	Prod.
January	10	2	4	4	45
February	6	1	3	2	75
March	8	3	2	3	20
April	9	3	1	5	30
May	34	11	3	20	603
June	15	12	..	3	529
July	3	2	..	1	20
August	5	2	1	2	210
September	17	3	7	7	340
October	7	3	1	3	300
November	4	1	1	2	220
December	14	10	1	3	420
Totals—					
1916	132	53	24	55	2,812
1915	81	15	20	46	570
1914	30	16	2	12	318
1913	113	40	26	67	707

Kansas.

Total Wells Drilled.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	156	140	9	7	2,940
February	190	161	13	16	3,895
March	294	254	15	25	5,200
April	352	297	8	47	8,760
May	480	420	14	46	12,595
June	488	435	9	44	23,500
July	434	408	10	16	18,664
August	310	258	9	43	22,800
September	288	238	10	40	28,168
October	177	146	4	27	29,420
November	278	239	4	35	16,561
December	193	171	11	11	10,780
Totals—					
1916	3,640	3,167	116	357	183,343
1915	1,123	640	344	139	7,238
1914	2,392	1,817	305	272	18,036
1913	2,180	1,518	346	298	18,977
1912	1,012	536	301	175	11,219

Districts—Wells Drilled in 1916.

	Comp.	Oil.	Gas.	Dry.	Prod.
Montgomery	864	780	36	48	8,267
Chautauqua	510	439	20	51	7,447
Butler	1,009	846	36	127	154,002
Wilson	68	63	3	2	575
Neosho	252	236	6	10	4,271
Allen	326	314	6	6	3,178
Franklin	252	235	3	14	2,010
Miami	275	217	2	56	3,125
Miscellaneous	84	37	4	43	468
Totals—					
1916	3,640	3,167	116	357	183,343
1915	1,123	640	344	139	7,938
1914	2,394	1,817	305	272	18,036
1913	2,180	1,518	364	298	18,977
1912	1,012	534	301	175	11,219

Successful Oil Wells, 1916.

	Mont- gomery.	Chau- tauqua.	Butler.	Wil- son.	Neosho.	Allen.	Frank- lin.	Miami.	Miscella- neous.	Total.
January	59	31	9	..	9	11	12	9	..	140
February	71	24	5	..	17	15	11	18	..	161
March	52	30	53	3	21	33	17	22	3	254
April	71	43	58	4	31	42	21	24	3	297
May	91	46	113	15	32	46	34	30	13	420
June	109	56	111	6	27	49	38	31	8	435
July	75	77	70	11	41	57	48	26	3	408
August	63	36	108	4	10	11	12	13	1	258
September	78	26	94	4	9	7	8	10	2	238
October	15	8	81	4	9	8	10	10	1	146
November	39	30	74	9	12	16	20	16	3	239
December	37	12	70	3	18	19	4	8	..	171
Totals, 1916	780	439	846	63	236	314	235	217	37	3,167
Totals, 1915	290	114	17	10	96	49	77	35	42	640
Totals, 1914	716	328	..	28	224	175	168	132	46	1,817

Gas Wells, 1915.

	Mont- gomery.	Chau- tauqua.	Butler.	Wil- son.	Neosho.	Allen.	Frank- lin.	Miami.	Miscella- neous.	Total.
January	6	..	1	..	..	2	..	..	..	9
February	7	2	2	..	1	..	..	1	..	13
March	8	3	3	..	..	..	..	..	1	15
April	2	4	..	1	..	..	1	..	..	8
May	3	2	3	2	1	1	1	1	..	14
June	2	4	3	..	..	..	..	..	..	9
July	1	1	6	..	..	..	1	..	1	10
August	4	1	3	..	1	..	..	..	..	9
September	1	2	4	..	1	2	..	..	..	10
October	..	1	..	..	..	1	..	..	2	4
November	1	..	1	2	..	..	..	..	..	4
December	1	..	10	..	..	..	..	..	..	11
Totals, 1916	36	20	36	3	6	6	3	2	4	116
Totals, 1915	131	25	5	13	43	14	35	6	72	344
Totals, 1914	138	30	..	12	23	8	32	13	49	304

Dry Holes, 1916.

	Mont- gomery.	Chau- tauqua.	Butler.	Wil- son.	Neosho.	Allen.	Frank- lin.	Miami.	Miscella- neous.	Total.
January	3	2	..	..	..	..	..	2	..	7
February	5	4	4	..	3	..	..	..	..	16
March	12	2	8	..	..	..	..	3	..	25
April	8	4	13	2	1	2	..	15	2	47
May	5	5	16	..	5	1	4	9	1	46
June	6	11	15	..	..	2	2	8	..	44
July	2	5	2	..	..	..	2	2	3	16
August	2	4	17	..	..	..	2	5	10	40
September	3	10	17	..	1	1	1	1	6	40
October	..	2	7	..	..	..	2	2	14	27
November	..	2	19	..	..	..	1	6	7	35
December	2	..	9	..	..	..	..	..	..	11
Totals, 1916	48	51	127	2	10	6	14	56	43	357
Totals, 1915	51	27	1	2	10	4	9	15	20	139
Totals, 1914	75	38	..	20	19	10	29	43	38	272

Estimated New Prodution, 1916.

	Mont- gomery.	Chau- tauqua.	Butler.	Wil- son.	Neosho.	Allen.	Frank- lin.	Miami.	Miscella- neous.	Total.
January	703	717	645	..	125	130	130	490	..	2,940
February	896	750	30	..	1,530	140	110	439	..	3,895
March	795	640	2,707	25	280	264	135	324	30	5,200
April	843	615	5,420	45	510	525	295	474	33	8,760
May	452	995	9,462	80	429	492	320	240	125	12,595
June	915	1,100	20,052	50	365	475	224	224	95	23,500
July	749	875	15,50	115	402	518	305	150	45	18,664
August	646	410	21,164	70	125	151	150	134	10	22,800
September	790	525	26,345	45	100	73	85	170	35	28,168
October	365	205	28,376	20	95	85	86	160	28	29,420
November	695	385	14,701	70	130	160	130	225	65	16,561
December	420	230	9,595	55	180	165	40	95	..	10,780
Totals, 1916	8,267	7,447	154,002	575	4,271	3,178	2,010	3,125	468	183,343
Totals, 1915	1,689	1,710	1,655	67	839	455	578	385	461	7,938
Totals, 1914	6,061	4,829	...	254	2,376	1,808	1,304	976	414	18,036

Montgomery County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	68	59	6	3	703
February	83	71	7	5	896
March	74	71	2	12	795
April	81	71	2	8	841
May	99	91	3	5	452
June	117	109	2	6	915
July	78	75	1	2	749
August	69	63	4	2	646
September	82	78	1	3	790
October	15	15	..	..	365
November	60	59	1	..	695
December	40	37	1	2	420
Totals—					
1916	864	780	36	48	8,267
1915	382	200	131	51	1,689
1914	929	716	138	75	6,061
1913	877	599	176	102	5,028
1912	396	203	137	56	3,903

Chautauqua County

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	33	31	..	2	717
February	30	24	2	4	750
March	55	50	3	2	640
April	51	43	4	4	615
May	53	46	2	5	995
June	71	59	4	11	1,100
July	83	77	1	5	875
August	41	36	1	4	410
September	38	26	2	10	525
October	11	8	1	2	205
November	32	30	..	2	385
December	12	12	..	..	230
Totals—					
1916	510	439	20	51	7,447
1915	106	114	25	27	1,710
1914	396	328	30	38	4,829
1913	457	326	55	76	6,063
1912	225	175	13	37	4,430

Butler County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	10	9	1	..	645
February	11	5	2	4	30
March	64	53	3	8	2,707
April	71	58	..	13	5,420
May	132	113	3	16	9,462
June	129	111	3	15	20,052
July	78	70	6	2	15,505
August	128	108	3	17	21,164
September	115	94	4	17	26,345
October	88	81	..	7	28,376
November	94	74	1	19	14,701
December	89	70	10	9	9,595
Totals—					
1916	1,009	846	36	127	154,002
1915	23	17	5	1	1,655

Wilson County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	..	..	..	..	..
February	..	..	..	..	..
March	3	3	..	..	25
April	7	4	1	2	45
May	17	15	2	..	80
June	6	6	..	..	50
July	11	11	..	..	115
August	4	4	..	..	70
September	4	4	..	..	45
October	4	4	..	..	20
November	9	9	..	..	70
December	3	3	..	..	55
Totals—					
1916	68	63	3	2	575
1915	25	10	13	2	67
1914	60	28	13	20	254
1913	148	41	58	49	360
1912	171	..	..	..	..

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Neosho County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	9	9	..	..	125
February	21	17	1	3	1,530
March	21	21	..	..	280
April	32	31	..	1	510
May	38	32	1	5	429
June	27	27	..	..	365
July	41	41	..	..	402
August	11	10	1	..	125
September	11	9	1	1	100
October	9	9	..	..	95
November	14	12	2	..	130
December	18	18	..	..	180
Totals—					
1916	252	236	6	10	4,271
1915	149	96	43	10	938
1914	266	224	23	19	2,376
1913	314	253	30	31	4,225
1912	115	..	..	..	..

Allen County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	13	11	2	..	130
February	15	15	..	..	140
March	33	33	..	..	264
April	44	42	..	2	525
May	48	46	1	1	492
June	51	49	..	2	475
July	57	57	..	..	518
August	11	11	..	..	151
September	10	7	2	1	73
October	9	8	1	..	85
November	16	16	..	..	160
December	19	19	..	..	165
Totals—					
1916	326	314	6	6	3,178
1915	67	49	14	4	445
1914	193	175	8	10	1,808
1913	179	156	8	15	2,262
1912	69	..	..	..	..

Franklin County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	12	12	..	..	130
February	11	11	..	..	110
March	17	17	..	..	135
April	22	21	1	..	295
May	39	34	1	4	320
June	40	38	..	2	224
July	51	48	1	2	305
August	14	12	..	2	150
September	9	8	..	1	85
October	12	10	..	2	86
November	21	20	..	1	130
December	4	4	..	..	40
Totals—					
1916	252	235	3	14	2,010
1915	121	77	35	9	578
1914	229	168	32	29	1,304
1913	58	53	1	4	606
1912	26	..	..	..	..

Miami County.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
January	11	9	..	2	490
February	19	18	1	..	439
March	25	22	..	3	324
April	39	24	..	15	474
May	40	39	1	9	240
June	39	31	..	8	224
July	28	26	..	2	150
August	21	13	..	8	134
September	11	10	..	1	170
October	12	10	..	2	160
November	22	16	..	6	225
December	8	8	..	..	95
Totals—					
1916	275	217	2	56	3,125
1915	56	35	6	15	385
1914	188	132	13	43	976

Miscellaneous.

1916.	Comp.	Oil.	Gas.	Dry.	Prod.
March	4	3	1	..	30
April	5	3	..	2	35
May	14	13	..	1	125
June	8	8	..	..	95
July	7	3	1	3	45
August	11	1	..	10	10
September	8	2	..	6	35
October	17	1	2	14	28
November	10	3	..	7	65
Totals—					
1916	84	37	4	43	468
1915	134	42	72	20	461
1914	433	46	49	38	414
1913	63	12	26	15	87

Mid-Continent Refining in 1916.

The Indiahoma Refining Company is increasing the capacity of its plant at East St. Louis from 1,000 barrels a day to 3,000 barrels a day. It is installing a complete laboratory which will be in charge of Harry L. Deming. The Indiahoma Company now has an investment of over $2,225,000. It owns 150 barrels a day production and has 200 miles of pipeline. It owns and operates 500 tank cars.

The Phoenix Refining Company has doubled the capacity of its plant the past year. It owns extensive lease holdings throughout the field, represents an investment of over $500,000, operates 145 tank cars and owns 24 miles of pipeline. Its plans for the coming year contemplate one of the most complete experimental stations in the mid-continent field. The building will include testing rooms, chemist's laboratory, dark room, receiving room, sample room, storage room, etc. It will be in charge of a thorough workman. Manager Melvin is also building a complete hospital room as first aid to the injured in connection with his plant. The Phoenix Refining Company has expended over $175,000 in improvements during 1916.

The Constantin Refining Company now represents a total investment of $815,000. The unusual feature of this statement rests in the fact that Mr. Constantin took a plant of little consequence at Tulsa three years ago and has built up his present magnificent plant from an investment of $8,000. The improvements to his plant in 1916 amounted to $160,000. The plant now has a daily capacity of about 5,000 barrels, the actual runs for 1916 averaging 3,500 barrels a day. The Constantin plant owns 200 tank cars and operates an additional 200 under lease. The company owns 25 miles of pipeline. Mr. Constantin also owns a half interest in the Boynton Refining Company.

Southern Oil Plant in Cushing District.

The Southern Oil Corporation has one of the ideal plants in the Cushing district. It represents an investment of $1,200,000. This institution has been built up through the personal aggressiveness of R. S. Ayers The refinery has a capacity of 7,000 barrels a day and actually ran an average of 5,000 barrels of crude a day in 1916. It owns 70 miles of pipeline into the Cushing field and operates 172 tank cars.

A refining institution that has come into immediate attention and importance is the Pan-American Refining Company at Tulsa, Okla. This organization is headed by J. M. Burk and Myers Gross, who were formerly active in the Gulf Coast oil fields. They are live wires and are "doers" of things. The Pan-American plant cost $750,000. It owns 450 barrels a day production, has built eight miles pipeline, owns 460 tank cars, and is now running 1,650 barrels of crude a day. Six additional stills will be consructed immediately so that it will have a capacity by April 1 of 6,000 barrels a day. It is erecting four 55,000 barrel steel tanks and during the coming year will add a wax plant to the refinery.

Cosden & Co.

Cosden & Co. is one of the biggest and most important independent oil concerns in the United States. It occupies a unique position in American oildom and is growing by leaps and bounds. The business is concentrated and characterized for its efficiency. The combined Cosden refinery and producing interests represent an investment exceeding $30,000,000. This includes 18,000 barrels a day production, 500 **miles of pipeline, 1,200 tank cars,** and a complete lubricating plant, the capacity of which is now being increased to 1,500 barrels of lubricating oil a day. The capacity of the Tulsa refinery is being increased from 15,000 to 45,000 barrels of crude a day.

The Peerless Refining Company has an investment of $651,000. It owns 150 tank cars and is admirably located at the gateway of the Cushing field.

The International Refining Company, which also operates the Ardmore refinery, now embraces a total investment of $8,000,000. The company owns 6,000 barrels a day production and has 60 miles of pipeline. It operates 500 tank cars, of which number it owns outright 300. Recently this organization took over the Gunsburg-Forman interests in the south part of the field.

The Doherty Syndicate.

One of the large and potent influences in the mid-continent field which has developed entirely in the past year is familiarly known to the public as the Doherty syndicate. This company has recently acquired four refineries and is combining these interests under one management to be known as the American Refining Company with principal offices at Tulsa, Okla. The Doherty syndicate now includes the American refinery at Okmulgee, Okla., the Producers' refinery at Gainesville, Texas; the Oklahoma Refining Company's plant at Oklahoma City, Okla.; the Cushing refinery at Cushing, Okla., and the Ponca refinery at Ponca City, Okla. There is a complete lubricating plant in connection with the latter refinery. The total valuation of its refining interests is approximately $7,000,000, including attractive contracts. The Doherty interests own in Butler county, Kansas, 35,000 barrels a day of high grade production. The total value of the Doherty refining and producing interests is supposed to aggregate something like $35,000,000.

The American refinery will have, as soon as its present orders are filled, 260 tank cars in operation; it owns 65 miles of pipeline and represents an investment of $750,000; the capacity of the refinery has been largely increased recently and will probably run an average of about 2,500 barrels a day in 1917. The Producers' refinery handled fully 8,000 barrels of crude a day in 1916; it owns 75 miles of pipeline from the refinery to the Healdton pool, including gathering lines. The Producers' refinery, not including tank cars, represents an investment of $1,250,000. The Cushing refinery ran an average of 2,500 barrels of crude a day in 1916, has an investment of over $200,000, and operates five miles of pipeline. The Ponca refinery has an investment of over $350,000, operates 95 miles of pipeline and actually treated 3,000 barrels of crude a day the past year. The Ponca, Cushing and Producers' companies own and operate 590 tank cars, the cost of which is not reckoned in the figures above. The Oklahoma Refining Company's plant now has a capacity of 2,000 barrels of crude a day, has been practically rebuilt during the past year and is an ideal institution. It owns its own filling stations and operates 68 tank cars. It averaged about 1,200 barrels of crude a day the past year.

The Sinclair Syndicate.

Probably the most spectacular event in the history of the mid-continent field has been the organization and launching of the Sinclair syndicate. Harry F. Sinclair had been known for years in mid-continent producing circles. He had earned a reputation as one of the most daring plungers oildom had ever seen and his judgment was phenomenal. It had become almost a by-word that wherever he drilled a well, he got a gusher. After dissolving partnership with P. J. White, he decided to enter the refining field and his first deal therein was a $70,000,000 merger, taking over the Milliken Refining Company at Vinita, Okla., the Chanute Refining Company's plants at Cushing, Okla., and Chanute, Kan., and the Cudahy Refining Company's refineries at Coffeyville, Kan., and Muskogee, Okla., and extensive producing properties owned by Mr. Sinclair and his associates. Since the merger the company has drilled in many excellent wells and added a number of large producing properties to its holdings. It is now one of the leading producing companies in the mid-continent field. In addition to the refineries owned, the company has plans to build a pipeline from Butler county, Kansas, to Chicago by way of Fort Madison, Iowa, and is starting work on a refinery at Kansas City, another at Fort Madison, and a third at Chicago. With these and the plant at Chanute, Kan., it will have four refineries on this line. This is probably the most gigantic undertaking an independent company ever attempted. It is apparent the company intends not only to have enough of its own production to supply its own refineries, but also sufficient marketing facilities to take care of its refined outpout as it is buying many distributing stations throughout the Indiana territory and will soon be second only in this respect to the Standard Oil Company of Indiana.

Petroleum Products Company.

The Petroleum Products Company at Independence, Kan., has averaged 3,000 barrels a day the past year. The Standard Asphalt and Rubber Company is operated in connection with this plant, using the heavier products in the manufacture of road materials, etc. The total investment is about $2,750,000. The company operates 200 miles of pipeline and 200 tank cars. It has a lubricating plant in connection, the capacity of which was doubled the past year by the installation of eight new presses.

The Mid-Continent Gasoline Company erected a refinery at Tulsa, Okla., during the past year and is now running about 5,000 barrels a day. This plant runs principally on kerosene distillates, but owns about 2,000 barrels a day production of its own. It has 100 tank cars and is now increasing its capacity by the construction of four additional stills. It has an investment of about $125,000.

The Lesh Refining Company at Arkansas City, Kan., has made splendid progress in its brief existence. It is now putting in a wax plant and when completed will have an investment of $300,000. The company started without anything and its growth is a testimonial to the business ability of its owner, Dr. A. J. Lesh. The refinery is located at Arkansas City and is running about 1,200 barrels a day, but will soon have a capacity of 2,000 barrels a day. It increased its precipitation of gasoline 3 per cent. in 1916 over 1915. The company owns twelve distributing stations.

Muskogee Refining Company.

The Muskogee Refining Company is one of the exceptionally attractive propositions in the mid-continent field at the present time. It has been growing remarkably under its present ownership. It now represents an investment of $1,250,000. This is the more remarkable when are recalled its early history and the tribulations through which it passed. It seems to have a brilliant future. Plans are already made to double the capacity early in 1917. It owns approximately 75 miles of pipeline, to which are connected about 270 producing wells. It makes all grades of light oils and lubricating oils, greases and wax.

The Magnolia Petroleum Company has grown remarkably fast since it entered the mid-continent field in 1914. In these three years it has purchased and handled in Oklahoma 12,849,997 barrels of crude. It operates a refinery at Fort Worth, Texas, on Oklahoma crude almost exclusively. This company owns and operates approximately 1,117 miles of 8-inch, 131 miles of 6-inch and 30 miles of 4-inch pipelines, besides 300 miles of gravity system lines. It has 690 miles of telegraph lines. Nearly all companies operating pipelines these days find it necessary also to have telegraph lines of their own. The Magnolia has 234 steel storage tanks in connection with its pipeline system. On December 1, 1916, it employed 735 men. It has operated chiefly in the Healdton pool, but has recently acquired a pipeline to Cushing.

Other New Concerns.

One of the new refining concerns is the Central Refining Company, located at Drumright, Okla. It has a capacity of nearly 1,000 barrels a day and gets its crude within a radius of a mile. The plant cost $15,000, and will manufacture gasoline and fuel oil.

The Crescent Refining Company is one of the newest contenders for recognition in refining circles in the Oklahoma field. Its plant is nearing completion. It is located at Newkirk, Okla., and will represent an investment of $200,000 with a daily capacity of about 3,000 barrels. It will have 13 miles of 4-inch and 8 miles of 2-inch pipelines.

The Star Refining Company is of the vintage of 1916, although it will not be ready to start operations until February 1. The plant cost about $16,000, is located at Yale, Okla., and has a capacity of 1,000 barrels a day. One and a half miles of pipeline connect it to wells in the Yale pool, which will supply it with a sufficient amount of crude.

The White Star Refining Company is building a plant at Tulsa, Okla. It will be ready for operation February 1 and will cost about $100,000. It will not operate on crude, but will handle distillates from other refineries and have a capacity of 2,000 brrels a day. It will make gasoline, greaseless naphtha with low end-point and fuel oil.

L. L. Marcell, who was one of the principal owners of the Chanute Refining Company when it entered into the Sinclair merger, together with J. H. and F. L. Miller and A. N. Allen, of Chanute, Kan., has organized the White Eagle Petroleum Company and is building an ideal plant on a fine location within the city limits of Augusta, Kan. It is expected the plant will be ready for operation by April 1 and will have an approximate investment, including tank cars, of $750,000. It is expected it will start off with a capacity of about 5,000 barrels a day, manufacturing gasoline, kerosene, distillates, gas and fuel oils. Mr. Marcell is now the principal owner in four different refineries in the mid-continent field.

Sterling Oil and Refining.

A new concern that is not yet in operation, but which has been commanding a great deal of attention in the Kansas field, is known as the Sterling Oil and Refining Company and is located at Wichita, Kan. It will be ready for operation June 1 and will have a capacity of 5,000 barrels of crude a day, manufacturing gasoline, kerosene, gas and fuel oils, lubricating oils, greases and wax. The plant will cost approximately $500,000. At the present time a 20 mile 8-inch pipeline is being laid from Augusta to Wichita. The company owns its own production in Eastern Kansas, but will not connect its wells to this line. It owns leases in Butler county, Kansas, which it expects to develop.

Recently Harry M. Evans and Fred H. Thwing, of Kansas City, principal owners of the Ponca Refining Company, the Cushing Refining Company and the Producers' Refining Company sold their holdings to the Doherty syndicate. At that time they intended to retire completely from the refining business. They have since, however, organized the Evans-Thwing Refining Company with a paid-up capital of $1,000,000 and have started building a plant in Kansas City with a daily capacity of 4,000 barrels. They have purchased material for another plant which will be located somewhere in the Kansas field. They have also placed order for 150 tank cars. A third plant will be erected later. The company proposes acquiring its own production.

One of the big growing concerns in the mid-continent field is the North American Refining Company at Pemeta, Okla. This is the Colcord-Wheatcroft interests. The Pemeta plant has installed the Parker cracking process and is making a success of it. It has also increased its capacity and has lately organized on a more extensive financial basis and will materially increase its operations in 1917. It owns the Rosedale Refining Company at Rosedale, Kan., a suburb of Kansas City, and is at the present time building a 4,000 barrel plant at Sheffield, another suburb of Kansas City.

A. F. Vandersall, who built the Crystal White refinery at Allen, Okla., his interest in which he sold to good advantage, has now planned to erect a 1,500-barrel plant at Ottawa, Kan.

Mid-Continent Refineries, 1916.

Company and location of refinery.	Year built.	Approximate investment.	Daily average crude used, Bbls., 1916.
Doherty Syndicate—		$7,000,000	
American Refining Co., Okmulgee, Okla.	1907		1,500
Oklahoma Refining Co., Oklohoma City, Okla.	1906		1,200
Cushing Refining Co., Cushing, Okla.	1912		2,500
Ponca Refining Co., Ponca City, Okla.	1912		3,000
Producers' Refining Co., Gainesville, Tex.	1915		8,000
Sinclair Syndicate—		35,000,000	
Cudahy Refining Co., Muskogee, Okla.	1905		300
Cudahy Refining Co., Coffeyville, Kan.	1909		4,500
Chanute Refining Co., Cushing, Okla.	1914		4,500
Chanute Refining Co., Chanute, Kan.	1907		1,600
Milliken Refining Co., Vinita, Okla.	1910		6,000
Consolidated Oil Refining Co.—			
Cleveland, Okla.	1913	100,000	530
East St. Louis, Ill.	1909	50,000	1,000
East St. Louis, Ill.	1915	35,000	300
Consumers' Refining Co., Cushing, Okla.	1912	864,790	4,500
Capital Refining Co., Oklahoma City, Okla.	1915	20,000	300
Cosden & Co.—		30,000,000	
Tulsa, Okla.	1912		11,000
Bigheart, Okla.	1908		600
Cushing, Okla.	1911		1,400
Crystal White Refining Co., Allen, Okla.	1915	16,000	300
Constantin Refining Co., Tulsa, Okla.	1911	815,000	3,500
Boynton Refining Co., Boynton, Okla.	1916	45,000	*300
Continental Refining Co., Bristow, Okla.	1914	166,000	1,300
Hillman Refining Co., Cushing, Okla.	1914	12,000	500
Illinois Oil Co., Cushing, Okla.	1914	65,000	1,200
Indiahoma Ref. Co.—		2,225,000	
Okmulgee, Okla.	1910		2,200
East St. Louis, Ill.	1907		750
International Ref. Co.—		8,000,000	
Ardmore, Okla.	1914		5,800
Cushing, Okla.	1915		5,000
Lawton Refining Co., Lawton, Okla.	1916	20,000	300
Muskogee Refining Co., Muskogee, Okla.	1905	1,250,000	1,500
Mid-Continent Gasoline Co., Tulsa, Okla.	1916	125,000	*800
Economy Oil and Refining Co., Blackwell, Okla.	1916	50,000	*500
North American Refining Co., Pemeta, Okla.	1915	175,000	2,200
Oilton Refining Co., Oilton, Okla.	1916	6,000	300
Pan-American Refining Co., Tulsa, Okla.	1916	750,000	*440
Peerless Refining Co., Cushing, Okla.	1914	651,000	3,000
Phoenix Refining Co., Sand Springs, Okla.	1913	500,000	2,000
Pierce Oil Corporation, Sand Springs, Okla.	1913	875,000	10,000
Roxana Petroleum Co., Cushing, Okla.	1916	1,000,000	10,000
Park Lake Refining Co., Okmulgee, Okla.	1915	10,000	300
Sapulpa Refining Co., Sapulpa, Okla.	1908	749,900	3,500
Southern Oil Corporation, Yale, Okla.	1915	1,200,000	5,000
Sun Oil Co., Yale, Okla.	1915	100,000	2,500
Tiger Refining Co., Okmulgee, Okla.	1916	50,000	800
Texas Company, Tulsa, Okla.	1910	350,000	10,000
Uncle Sam Oil Co., Tulsa, Okla.	1906	100,000	800
Webster Oil and Gasoline Co., Yale, Okla.	1915	17,030	800
Webster Refining Co., Coalton, Okla.	1911		Idle
Superior Oil Co., Yale, Okla.	1916	5,000	*100
Yale Oil Refining Co., Yale, Okla.	1916	12,000	*100

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Company and location of refinery.	Year built.	Approximate investment.	Daily average crude used. Bbls., 1916.
Commonwealth Oil and Refining Co., Moran, Kan. (Formerly Eastern Kansas Oil Co.)	1905	300,000	300
Eldorado Refining Co., Eldorado, Kan.	1916	55,000	*255
Great Western Oil Refining Co., Erie, Kan.	1905	700,000	700
Hutchinson Refining Co., Hutchinson, Kan.	1915	10,000	150
Kansas Oil Refining Co., Coffeyville, Kan.	1906	325,000	1,650
Kansas Co-operative Refining Co., Chanute, Kan.	1906	225,000	500
Kanotex Refining Co., Caney, Kan.	1906	650,000	800
Kansas City Refining Co., Kansas City, Kan.	1906	350,000	1,640
General Refining Co., Kansas City, Kan.	1910	225,000	700
Lesh Refining Co., Arkansas City, Kan.	1914	225,000	1,200
Miller Petroleum Refining Co., Humboldt, Kan.	1906	75,000	500
National Refining Co., Coffeyville, Kan.	1907	550,000	5,000
O-K Refining Co., Niotaze, Kan.	1905	275,000	1,200
Petroleum Products Co., Independence, Kan.	1909	2,750,000	3,000
Rollin Oil Refinery, Chanute, Kan.	1904	20,000	100
Rosedale Refining Co., Rosedale, Kan.	1915	100,000	1,000
Uncle Sam Oil Co., Cherryvale, Kan.	1906	200,000	600
Wichita Independent Oil and Refining Co., Wichita, Kan.	1914	35,000	600
Wilhoit Refining Co., Joplin, Mo.	1914	125,000	900
St. Joseph Viscosity Oil and Refining Co., St. Joseph, Mo.	1915	20,000	300
Anderson & Gustafson (sold), St. Louis, Mo.	1916	5,000	200
Totals		$99,590,720	148,815
Plants now building		3,500,000	5,000
Grand totals (independents)		$103,099,720	153,815
Standard group		8,000,000	60,000
Final totals		$111,099,720	213,815

* These plants began operating late in the year, their average runs now are two to five times what the figures show the average to have been in 1916.

Standard Refineries.

Carter Oil Co., Norfolk, Okla.	1916	$3,500,000	40,000
Standard Oil Co., Neodesha, Kan.	1892	1,500,000	7,500
Standard Oil Co., Sugar Creek, Mo.	1907	3,000,000	12,500
Totals		$8,000,000	60,000

Refineries in Course of Construction or Projected.

Name of company and location of refinery.	To start operations.	Approximate investment.	Capacity, bbls.
Ozark Refining Co., Fort Smith, Ark.	Jan.,* 1917	$46,000	700
Central Refining Co., Drumright, Okla.	Jan., 1917	15,000	1,000
Crescent Refining Co., Newkirk, Okla. (Skimming plant.)	Feb. 1, 1917	200,000	3,000
Star Refining Co., Yale, Okla.	Feb. 1, 1917	16,000	1,000
White Star Refining Co., Tulsa, Okla.	April 1, 1917	100,000	2,000
Acme Refining Co., Tulsa, Okla.	.....	*25,000	....
Birmingham Oil and Gas Co., Muskogee, Okla.	.....	*1,000,000	....
Brazilian Oil and Refining Co., Tulsa, Okla.	.....	*100,000	....
Consumers' Refining Co. of Okla., Oklahoma City, Okla.	.....	*250,000	....
Dean Oil Co., Cushing, Okla.	.....	.....	....
Duluth Refining Co., Sapulpa, Okla.	.....	.....	....
E. A. Hawley, Cushing, Okla.	.....	.....	400
Holly & Owens, Cushing, Okla.	.....	.....	....
Inland Refining Co., Tulsa, Okla.	.....	*1,000,000	....
Marion Refining Co., Chelsea, Okla.	.....	.....	....
F. D. Misener, Broken Arrow.	.....	.....	....
North Iowa Oil and Refining Co., Lawton, Okla.	.....	*50,000	....
Oneta Refining Co., Oneta, Okla.	.....	*50,000	....
Osage Refining Co., Hominy, Okla.	.....	*50,000	....
Paramount Oil and Refining Co., Sapulpa, Okla.	.....	.....	....
Star Refining Co., Yale, Okla.	.....	*20,000	....
White Eagle Petroleum Co., Augusta, Kan.	March 1, 1917	750,000	5,000
Sterling oil and Refining Co., Wichita, Kan.	June 1, 1917	500,000	5,000
Kanita Refining Co., Wichita, Kan.	.....	.....	....
Western Refining Co., Wichita, Kan.	.....	25,000	1,000
Augusta Refining Co., Augusta, Kan.	.....	*750,000	5,000
Craig & Kaufman, Eldorado, Kan.	.....	.....	....
H. T. Lynch et al., Eldorado, Kan.	.....	.....	4,000
Milliken & Co., Arkansas City, Kan.	.....	*1,000,000	....
Piper & Boiene, Eldorado, Kan.	.....	.....	1,000
J. A. Wilson, Mgr., Eldorado, Kan.	.....	.....	500
Red Ball Oil and Refining Co., Ottawa, Kan.	.....	150,000	1,000
Evans-Thwing Refining Co., Kansas City, Mo.	.....	.....	4,000
Rosedale Refining Co., Kansas City, Mo.	May 1, 1917	150,000	5,000
Sinclair Oil and Refining Co., Kansas City, Mo.	.....	.....	4,000

* Capital stock.

Refineries Having Lubricating Plants.

Cudahy Refining Company, Coffeyville, Kan.
Great Western Oil Refining Company, Erie, Kan.
Kansas City Refining Company, Kansas City, Kan.
Kansas Co-operative Refining Company, Chanute, Kan.
National Refining Company, Coffeyville, Kan.
Petroleum Products Company, Independence, Kan.
Uncle Sam Oil Company, Kansas City, Kan.
American Refining Company, Okmulgee, Okla.
Consumers' Refining Company, Cushing, Okla.
Cosden & Co., Tulsa, Okla.
Ponca Refining Company, Ponca City, Okla.
Muskogee Refining Company, Muskogee, Okla.
Sinclair Oil and Refining Company, Vinita, Okla.
Webster Oil and Gasoline Company, Yale, Okla.
Magnolia Petroleum Company, Fort Worth, Tex.
Ozark Refining Company, Fort Smith, Ark.

Refining Companies Having Distributing Stations.

Name of company.	Number of stations.
Lesh Refining Company, Arkansas City, Kan.	12
Great Western Oil Refining Company, Erie, Kan.	60
Kanotex Refining Company, Caney, Kan.	27
Kansas Co-operative Refining Company, Chanute, Kan.	16
Kansas Oil Refining Company, Coffeyville, Kan.	31
Kansas City Refining Company, Kansas City, Kan.	5
Miller Petroleum Refining Company, Humboldt, Kan.	14
National Refining Company, Coffeyville, Kan.	64
Sinclair Oil and Refining Company (formerly Chanute Refining Company), Chanute, Kan.	40
Cudahy Refining Company, Coffeyville, Kan.	259
Oklahoma Refining Company, Oklahoma City, Okla.	55
Indiahoma Refining Company, Okmulgee, Okla.	4
Cosden & Co., Tulsa, Okla.	4
Pierce Oil Corporation, Sand Springs, Okla.	400
Consumers' Refining Company, Cushing, Okla.	63
Wilhoit Refining Company, Joplin, Mo.	33
Magnolia Petroleum Company, Fort Worth, Tex.	442

Refineries with Pipelines.

Name of company.	No. miles pipeline operated.
Doherty Syndicate—	
American Refining Company, Okmulgee, Okla.	65
Cushing Refining Company, Cushing, Okla.	5
Ponca Refining Company, Ponca City, Okla.	95
Producers' Refining Company, Gainesville, Tex.	75
Sinclair Syndicate—	
Chanute Refining Company, Chanute, Kan.	15
Cudahy Refining Company, Coffeyville, Kan.	225
Cosden & Co., Tulsa, Okla.	500
Constantin Refining Company, Tulsa, Okla.	25
Consumers' Refining Company, Cushing, Okla.	118
Phoenix Refining Company, Sand Springs, Okla.	24
Pierce Oil Corporation, Sand Springs, Okla.	35
Indiahoma Refining Company, Okmulgee, Okla.	200
International Refining Company (Ardmore Refining Company), Tulsa, Okla.	60
Pan-American Refining Company, Tulsa, Okla.	8
Southern Oil Corporation, Yale, Okla.	70
Muskogee Refining Company, Muskogee, Okla.	75
Sapulpa Refining Company, Sapulpa, Okla.	33
North American Refining Company, Pemeta, Okla.	10
Webster Oil and Gasoline Company, Yale, Okla.	4
Crystal White Refining Company, Allen, Okla.	3
Commonwealth Oil and Refining Company, Moran, Kan.	3
Great Western Oil Refining Company, Erie, Kan.	24
Kanotex Refining Company, Caney, Kan.	43
Kansas Co-operative Refining Company, Chanute, Kan.	7
Kansas Oil Refining Company, Coffeyville, Kan.	70
Miller Petroleum Refining Company, Humboldt, Kan.	7
National Refining Company, Coffeyville, Kan.	110
Petroleum Products Company, Independence, Kan.	200
Rolling Oil Refinery, Chanute, Kan.	3
Total	2,122

Mid-Continent Tank Cars.

Name of company.	No. tank cars.
Doherty Syndicate:—	
American Ref. Co., Okmulgee, Okla.	269
Oklahoma Ref. Co., Oklahoma City, Okla.	68
Cushing Ref. Co., Cushing, Okla.; Ponca Ref. Co., Ponca City, Okla.; Producers' Ref. Co., Gainesville, Tex.	590
Cosden & Co., Tulsa, Okla.	1,200
Sinclair Syndicate:—	
Cudahy Ref. Co., Coffeyville, Kan.; Chanute Ref. Co., Chanute, Kan.; Milliken Ref. Co., Vinita, Okla.	1,140
Boynton Ref. Co., Boynton, Okla.	38
Constantin Ref. Co., Tulsa, Okla.	400
Consumers' Ref. Co., Cushing, Okla.	315
Consolidated Ref. Co., Cleveland, Okla.	21
Continental Ref. Co., Bristow, Okla.	15
Capital Ref. Co., Oklahoma City, Okla.	10
Crystal White Ref. Co., Allen, Okla.	3
Hillman Ref. Co., Cushing, Okla.	43
Indiahoma Ref. Co., Okmulgee, Okla.	500
Illinois Ref. Co., Cushing, Okla.	43
International Ref. Co., Cushing, Okla.	300
Muskogee Ref. Co., Muskogee, Okla.	150
North American Ref. Co., Pemeta, Okla.	65
Phoenix Ref. Co., Sand Springs, Okla.	145
Pierce Oil Corporation, Sand Springs, Okla.	485
Peerless Ref. Co., Cushing, Okla.	150
Sapulpa Refining Co., Sapulpa, Okla.	400
Texas Company, Tulsa, Okla.	430
Webster Oil and Gasoline Co., Yale, Okla.	14
Mid-Continent Gasoline Co., Tulsa, Okla.	100
Pan-American Ref. Co., Tulsa, Okla.	460
Southern Oil Corporation, Yale, Okla.	172
Riverside Western Oil Co., Tulsa, Okla.	90
D. W. Franchot & Co., Tulsa, Okla.	12
Great Western Kansas Oil Ref. Co., Erie, Kan.	40
Commonwealth Oil and Ref. Co., Erie, Kan. (formerly Eastern Kansas Oil Co.)	23
Kanotex Refining Co., Caney, Kan.	37
Kansas City Ref. Co., Kansas City, Kan.	171
Kansas Co-operative Refining Co., Chanute, Kan.	50
Kansas Oil Refining Co., Coffeyville, Kan.	132
Miller Petroleum Refining Co., Humboldt, Kan.	25
National Ref. Co., Coffeyville, Kan.	325
Petroleum Products Co., Independence, Kan.	200
Lesh Refining Co., Arkansas City, Kan.	24
Rosedale Refining Co., Rosedale, Kan.	28
Wichita Independent Oil and Ref. Co., Wichita, Kan	22
General Ref. Co., Kansas City, Kan.	27
Uncle Sam Oil Co., Kansas City, Kan.; Cherryvale, Kan.; Tulsa, Okla.	52
Wilhoit Ref. Co., Joplin, Mo.	35
St. Joseph Viscosity Oil and Ref. Co., St. Joseph, Mo.	..
Magnolia Petroleum Co., Fort Worth, Tex.	586
Evans-Thwing Ref. Co., Kansas City, Mo.	20
Total	9,435

Gasoline and Kerosene Percentages from Mid-Continent Crude.

District produced.	Kerosene, per cent.	Gasoline, per cent.
Kansas—		
Northern districts	28	8 to 13
Montgomedy county	25	12
Chautauqua county	24	15
Cowley county	..	18 to 20
Augusta	29	15.5 to 20
Eldorado	24	21.5 to 24
Cherryvale	29	12
Paola and Rantoul	21	13
Oklahoma—		
Blackwell	..	18 to 23
Bixby	..	18 to 23
Leonard	..	23 to 25
Stone Bluff	..	20 to 23
Dewey Deep	20	5.5
Dewey deep	20	5.5
Dewey shallow	28	12
Bartlesville	23	10
Osage	25	20
Ponca	25	22
Cleveland	28	14
Cushing	25	22 to 30
Fox Pool	25	30
Cole Pool	..	13
Healdton	26	9 to 11
Nowata	23	15 to 16

(These percentages depend very largely upon methods of distillation and whether the oil is fresh or stored. There is considerable variation in crudes in the same pool.)

Gravity of Mid-Continent Crude.

District.	Gravity.
Paola, Kan.	31.4
Rantoul, Kan.	30.9
Allen county, Kan.	22 to 28
Neosho county, Kan.	28 to 30
Montgomery county, Kan.	28 to 32
Chautauqua county, Kan.	32 to 34
Cherryvale, Kan.	30.6
Augusta, Kan.	32 to 34
Eldorado, Kan.	36 to 40
Blackwell, Okla.	37 to 39
Newkirk, Okla.	37 to 39
Ponca City, Okla.	37 to 40
Glenn Pool, Okla.	36 to 38
Henryetta, Okla.	28 to 37
Bald Hill, Okla.	35 to 37
Muskogee, Okla.	34 to 39
Bird Creek, Okla.	26 to 35
Healdton, Okla.	28 to 32
Cushing, Okla.	37 to 40
Fox Pool, Okla.	45
Nowata, Okla.	30 to 34

Mid-Continent Production of Casinghead Gasoline.

The casinghead gasoline business kept pace with other development in the mid-continent field the past year. According to the stories told, there was a splendid profit in the business in 1915 with the result that there was almost as much of a clamor in 1916 to embark in the manufacture of casinghead gasoline as in the establishment of refineries. Some extravagant prices have been paid for casinghead gasoline plants. At the close of 1915 it was estimated the daily raw production of casinghead gasoline in the mid-continent field aggregated 115,150 gallons. It was predicted in the report at that time that 1916 would witness the production of 150,000 gallons a day. That prediction was verified. At the beginning of 1916 there were thirty-four of these plants in the mid-continent field. At the beginning of 1917 there were 166. Many plants are now under course of construction or contemplated. It is estimated that when these are completed, the production will have been increased from 225,000 gallons a day to at least 275,000 gallons a day. The estimated total investment in casinghead gasoline plants in the mid-continent field is $10,000,000.

The average precipitation is two and a half gallons per thousand cubic feet of gas. About 60,000,000 cubic feet of gas are being used daily. Many absorption plants are now being installed, and it is estimated that after awhile much more gasoline will be made by the absorption plan than by the present compression system. Practically all buildings are now being constructed of steel and larger units are being erected. Many improvements have been made during the past year. Formerly it was considered impossible to operate a plant at a profit on gas that would run less than four gallons per thousand cubic feet. Now it is found, by better cooling system, improvements in naphtha pumping, directly connected engines and compressors eliminating belts, etc., and increased number and higher speed of vacuum pumps, it is possible to operate at a profit where the precipitation is only one gallon per thousand cubic feet. It is found possible to make a profit on half a pint to a thousand cubic feet of gas if the gas can thereafter be used for the manufacture of carbon.

Removing gasoline from natural gas does not materially lessen the value of the gas for use thereafter. There is a loss of only about 4 B. T. U.s in extracting the liquid gas and thereafter the gas is more uniform and gives better satisfaction than with the gasoline in it.

750,000 Gallons of Casinghead Gas a Day Lost.

During the past year the entire mid-continent field has been searched with a fine-tooth comb for producing properties with sufficient casinghead gasoline to warrant the installation of a plant. At one time it is estimated 750,000 gallons of gasoline a day were blowing into the air with escaping gas from Cushing wells.

There is still an opportunity for somebody to make a fortune for himself by inventing a process by which it is possible to arrest the fearful loss in weathering. In some instances this loss still amounts to as much as 60 per cent. of the raw product. There is not so much loss in shipping now as there used to be since the introduction of insulated cars. Manufacturers have also found that it is important to them not to store their product in the winter and carry it over into summer, but to sell it as soon as it is made. In their efforts to conserve the supply even the field lines are welded now, with slip joints here and there for expansion.

Increased profits are being made by selling more of the more valuable portions of the precipitation for the manufacture of high explosives. It is believed that when the government experimental station is in operation in Oklahoma ways and means will be found for arresting or capturing the lighter and more valuable portions that are now going out in vapors to waste.

The present price of casinghead gasoline is about 18c. at the factory. Usually the field price is about one cent under the Chicago tank wagon price.

It is generally conceded that Oklahoma is taking first rank in the production of casinghead gasoline, but West Virginia produces a better article possessing higher gravity for the same boiling point.

Manufacturers of Liquefied Petroleum Gas.

Ajax Gasoline Company, Kansas City, Mo.; Nowata, Okla.
Aiken Oil Company, Tulsa, Okla.; Dewey, Okla., Bartlesville, Okla.
Alta Oil and Development Company, Tulsa, Okla.
Arkansas Oil Company, Tulsa, Okla.; Tulsa, Okla.
Arrow Gasoline Company, Tulsa, Okla.; Broken Arrow, Okla.
Arthur Oil Company, Sapulpa, Okla.; Sapulpa, Okla.
J. G. Bradstreet & Co., Muskogee, Okla.; Muskogee, Okla.
Frank Brown, Independence, Kan.
Blackwell Oil Company, Blackwell, Okla.; Blackwell, Okla.
Boynton Gasoline Company, Tulsa, Okla.; Hays, Okla., Boynton, Okla.
H. U. Bartlett, Bristow, Okla.
Burns & Bradley, Glenn Pool.
Carter Oil Company New York City, N. Y.; Tulsa, Okla.
Chestnut & Smith (eleven plants), Tulsa, Okla.; Muskogee, Okla., Hamilton Switch, Okla., Beggs, Okla., Glenn Pool, Okla., Preston, Okla., Morris, Okla., Kiefer, Okla., Bixby, Okla.
Consumers' Refining Company, Chicago, Ill.; Cushing, Okla., Drumright, Okla.
Continental Gas Corporation, New York City, N. Y.; Lenapah, Okla.
Crosbie & Gillespie, Tulsa, Okla.; Kiefer, Okla., Glenn Pool, Okla.
Cosden Oil and Gas Company, Tulsa, Okla.; Shamrock, Okla.
Crystal Gasoline Company, Okmulgee, Okla.; Bald Hill, Okla.
Creek County Gas Company, Shamrock, Okla.
Crystal Oil Company, Morris, Okla.
Central Oil Company, Mounds, Okla.
Chicago Petroleum Prod. Company, Morris, Okla.
Cushing Gasoline Company, Cushing, Okla.
Cinco Oil Company, Chelsea, Okla.
Beaumont Oil Company, Tulsa, Okla.; Drumright, Okla.
Dewey Portland Cement Company, Dewey, Okla.; Dewey, Okla.
Diamond Gasoline Company, Kansas City, Mo.; Delaware, Okla., Ochelata, Okla., Nowata, Okla.
Denman Bros., Sedan, Kan.; Sedan, Kan.
De Soto Gasoline Company, Beaumont, Tex.; Wann, Okla.
Eagle Gasoline Company, Tulsa, Okla.; Watkins, Okla.
Fitzgerald, Chestnut & Withington, Tulsa, Okla.; Watkins, Okla.
D. W. Franchot & Co., Tulsa, Okla.; Kiefer, Okla.
Fidelity Gasoline Company, Tulsa, Okla.; Muskogee, Okla.
Gypsy Oil Company (gasoline department), Tulsa, Okla.; Kiefer, Okla., Glenn Pool, Okla.
Glen Gas Company, care Western Supply Company, Tulsa, Okla.; Kiefer, Okla.
Golden Gasoline Company, Bartlesville, Okla.; Bartlesville, Okla.
Hastings Gasoline Company, Bristow, Okla.; Sapulpa, Okla.
Hillman Gasoline Company, Cushing, Okla.; Drumright, Okla.
Henderson Gasoline Company, Nowata, Okla.; Delaware, Okla.
Higrade Petroleum and Gasoline Company, Tulsa, Okla.; Sedan, Kan.
Hill Oil and Gas Company, Tulsa, Okla.; Drumright, Okla.
Hull & Bradstreet, Muskogee, Okla.
Hull-McCune Company, Glenn Pool, Okla.
Hull & Terrel (five plants), Chelsea, Okla.
Hays Gasoline Company Boynton, Okla.
Industrial Gasoline Marketing Company, Tulsa, Okla.; Glenn Pool, Okla., Broken Arrow, Okla.
Jefferson Gasoline Company (three plants), Tulsa, Okla.; Drumright, Okla.
B. B. Jones, Bristow, Okla.; Oilton, Okla.
June Gasoline Company, Delaware, Okla.
Liquefied Petroleum and Gasoline Company, Tulsa, Okla.; Chelsea, Okla.
A. O. Lutley Gasoline Company, Morris, Okla.
Monarch Gasoline Company, Tulsa, Okla.; Watkins, Okla.
Maple Gasoline Company, Tulsa, Okla.; Bartlett, Okla.
McMann Oil Company, Tulsa, Okla.; Drumright, Okla.
McMann Oil Company, Tulsa, Okla.; Drumright, Okla.
Mid-Continent Petroleum Company, Tulsa, Okla.; Bartlesville, Okla., Adair Pool, Okla., Cushing, Okla. (three plants), Dewey, Okla., Drumright, Okla., Wann, Okla., Inola, Okla., Avant, Okla., Red Fork, Okla.
Motor Fuel Company, Sapulpa, Okla.
Motor Gasoline Company, Muskogee, Okla.; Muskogee, Okla.
Max-Rhea Oil Company, Tulsa, Okla.; Standard Spur, Okla., near Sapulpa, Okla.
Moon Gasoline Company, Tulsa, Okla.; Bixby, Okla.
McClain & Oliver, Muskogee, Okla.
McJunkin & Co., Kiefer, Okla.
Natural Gasoline Company, Tidioute, Pa.; Drumright, Okla.
National Products Company, Sapulpa, Okla., and Pittsburgh, Pa.; Oilton, Okla.
Osage and Oklahoma, Drumright, Okla., Cleveland, Okla., Oilton, Okla.
Oklahoma Natural Gasoline Company, Sapulpa, Okla.; Centrell, Okla., near Mounds, Okla.
Oklahoma Petroleum and Gasoline Company, Tulsa, Okla.; Glenn Pool, Okla., Standard Spur, Okla., near Sapulpa, Okla., Kiefer, Okla., Jenks, Okla., Glenn Pool, Okla.
Oklahoma Natural Gas Company, Tulsa, Okla.; Muskogee, Okla., Shamrock, Okla., Kelleyville, Okla.

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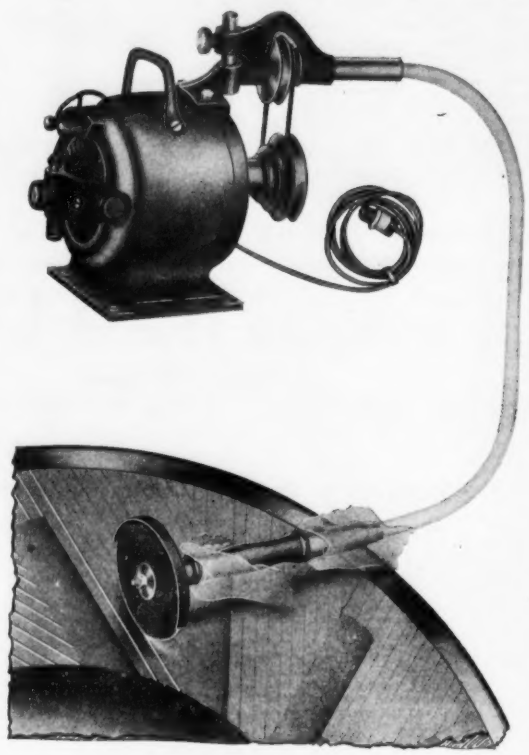

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Oil State Gasoline Company, Tulsa, Okla.; Jenks, Okla.
Osage Gasoline Company, Kansas City, Mo.; Ochelata, Okla.
Pine Pool Gasoline Company, Okmulgee, Okla.
Producers' Oil Company, Houston, Tex.; Drumright, Okla., Glenn Pool, Okla., Bald Hill, Okla.
Producers' Pipe Line Company, Nowata, Okla.
Pulaski Oil and Gas Company, Tulsa, Okla.; Turkey Mount, Okla.
Pringle et al., Jenks, Okla.
Quaker Oil Company, Kiefer, Okla.
Red Demon Gasoline Company, Muskogee, Okla.; Muskogee, Okla.
Rovera Oil and Gasoline Company, Okmulgee, Okla.; Bartlett, Okla.
Richards Gasoline Company, Sapulpa, Okla.; Standard Spur, Okla.
Riverside Western Oil Company, Tulsa, Okla.; Eram, Okla., Delaware, Okla., Okmulgee, Okla., Morris, Okla., Nowata, Okla., Chelsea, Okla. (two plants).
Salt Creek Gasoline Company, Nowata, Okla.
Sinclair Oil and Gas Company, Tulsa, Okla.; Cleveland, Okla.
Sedan Gasoline Company, Sedan, Kan.; Sedan, Kan.
C. B. Shafer, Cushing, Okla.; Drumright, Okla.
Smith & Swan, Henrietta, Okla.; Bartlett, Okla.
Sterling Gasoline Company, care Motor Gasoline Company, Muskogee, Okla.; Morris, Okla.
Sapulpa Refining Company, Sapulpa, Okla.
Sun Gasoline Company (three plants), Tulsa, Okla.; Muskogee, Okla.
Southern Gas Company, Okmulgee, Okla.; Okmulgee, Okla.
Sheets Bros., Muskogee, Okla.; Muskogee, Okla.
W. G. Skelly, Sapulpa, Okla.
Standard Oil Company of Indiana, Tulsa, Okla.; Cushing, Okla. (three plants).
Standard Oil Company of Louisiana, Shreveport, La.
Twin Hill Gasoline Company, Okmulgee, Okla.; Bald Hill, Okla.
Tidal Gasoline Company, Tulsa, Okla. (three plants).
T-B Gasoline Company, Tulsa, Okla.; Chelsea, Okla., Alluwe, Okla., Condys Bluff, Okla., and Childres, Okla.
Tulsa Gasoline Manufacturing Company, Tulsa, Okla.; Glenn Pool, Okla.
Tower Gasoline Company, Oklahoma City, Okla.; Blackwell, Okla.
Tibbens Gasoline Company, Glenn Pool, Okla.
Union Petroleum and Gasoline Company, Okmulgee, Okla.
Victor Gasoline Company, Tulsa, Okla.; Drumright, Okla.
Vulcan Oil and Gas Company, Havana, Kan.
Western Gasoline Company, Drumright, Okla.; Shamrock, Okla.
Whiteturkey Oil Company, Dewey, Okla.; Dewey, Okla.
Wichita Pipe Line Company, Bartlesville, Okla.; Drumright, Okla., Bigheart, Okla.
Wichita Natural Gas Company, Bartlesville, Okla.; Augusta, Kan., Caney, Kan., Gordon, Kan.
Whitefield Sear Oil Company, Muskogee, Okla.; Muskogee, Okla.
Weiss & Flynn, Beaumont, Tex.; Wann, Okla.
Bermont Oil Company.
Carter Oil Company.
Aiken, Cosden & Franchot.
Eastern Oil Company.
National Producers' Company (two plants).

Mid-Continent Oil Inspections.

The Supreme Court of Kansas early in 1916 held the oil inspection law of that State, fixing an inspection fee of 10c. a barrel on kerosene and gasoline, unconstitutional, chiefly because the fees amounted to a State revenue and were exorbitant. The Legislature had passed a bill reducing the fee from 10c. to 3c. a barrel, but the Governor vetoed it. After the action of the Supreme Court, the Governor attempted to coerce oil men into paying, voluntarily, 3c. a barrel. They refused, but offered to pay 1c., which they insisted would more than pay the expense of inspection. Toward the end of 1916 refiners began paying on a basis of 1c. a barrel. The State collected during the year $28,505.06; the cost of inspection in 1916 was $12,786.89. Under the ruling of the Supreme Court the fees shall not exceed materially the cost of inspection.

In 1916 there was inspected in Kansas 1,630,833 barrels of kerosene and gasoline. At 1c. a barrel this would have returned $16,308.33, or $3,521.44 more than the cost. In 1917 this surplus will probably be $7,000 to $10,000.

In Oklahoma the inspection fee was reduced from 10c. to 4c. In that State 75 per cent. of the fees go to the inspector. In 1916 the inspector received $19,745.09 and the State $8,031.94. It is the most expensive oil inspection in the United States. It is only a question of time until the Oklahoma oil inspector will have to drop this rich plum. Oklahoma certainly rides the oil industry.

Kansas Oil Inspection.

	Kerosene. Barrels.	Gasoline. Barrels.
1915		
December	53,656	73,063
1916.		
January	40,460	49,262
February	44,252	35,632
March	53,851	72,896
April	47,587	68,707
May	50,140	77,450
June	50,164	81,647
July	60,391	116,697
August	66,991	135,523
September	65,580	102,784
October	52,346	82,900
November	57,416	92,140
Totals, 1916	642,232	988,601
1915	601,599	634,481
1914	440,776	465,686
1913	419,945	414,265
1912	272,417	298,531
Total fees, 1916		$28,505.06
1915		110,798.37
1914		76,665.68
1913		48,336.42
1912		38,189.95
Cost of inspection, 1915		12,509.92
1916		12,786.89
Inspection fees returned to refiners in 1916		123,308.00

Standard Oil Company Inspection.

	Kerosene. Barrels.	Gasoline. Barrels.
1916.		
January	21,236	28,565
February	25,364	20,879
March	27,103	43,433
April	22,508	35,486
May	23,756	50,208
June	29,378	45,063
July	29,471	67,678
August	33,947	70,213
September	40,509	61,418
October	34,136	52,265
November	.....	.....
December	.....	.....
Totals	.....	.....

Independent Oil Companies Inspection.

	Kerosene. Barrels.	Gasoline. Barrels.
1916.		
January	19,224	20,697
February	20,888	14,753
March	26,748	29,463
April	25,079	33,221
May	26,384	27,242
June	20,786	36,584
July	30,920	49,019
August	33,044	56,319
September	25,089	41,366
October	18,210	30,535
November	.....	.....
December	.....	.....
Totals	.....	.....

Oklahoma Oil Inspection.

1915.	Barrels at 4c.	Barrels at 10c.	Fees received.
December	26,161	892	$1,135.64
1916.			
January	21,454	448	903.01
February	24,511	723	1,052.82
March	22,237	481	937.64
April	20,385	356	851.06
May	23,190	667	994.36
June	16,651	438	709.94
July	22,785	962	1,007.64
August	24,965	486	1,047.27
September	22,354	423	936.53
October	20,204	480	856.21
November	23,747	809	1,030.86
Totals	288,644	7,165	$11,462.98

1916.	Bbls. gas at 4c.	Bbls. gas at 10c.	Fees received.	Total fees received.	Net to State.
1915.					
Dec.	27,103	1,165	$1,200.62	$2,336.26	.....
1916.					
Jan.	21,762	872	957.70	1,860.71	559.55
Feb.	16,229	723	738.58	1,791.40	524.44
Mar.	25,933	697	1,107.08	2,044.72	606.23
April	23,079	619	985.11	1,836.17	565.79
May.	30,056	854	1,287.73	2,282.09	723.01
June.	28,863	362	1,190.75	1,900.69	548.84
July.	40,983	948	1,734.20	2,741.84	957.63
Aug.	47,802	734	1,985.50	3,032.77	941.92
Sept.	43,909	1,079	1,864.31	2,800.84	925.65
Oct..	38,232	583	1,587.66	2,443.87	810.75
Nov..	39,013	1,142	1,674.81	2,705.67	870.13
Total, 1916.	382,964	9,778	$16,314.05	$27,777.03	$8,031.94

Total amount paid for inspection, $19,745.09.

Interesting Facts About Cushing.

At the close of 1915 there was in storage Cushing crude to the amount of 47,249,370 barrels. At the close of 1916 40,870,000 barrels.

The Cushing pool was discovered in 1912; since then 3,538 wells have been drilled there.

The present production is about 94,000 barrels a day. The highest daily output was approximately 300,000 barrels. Practically all Cushing crude now commands a premium, in some instances reaching 85 cents a barrel.

There are 16 refineries in the Cushing district, all built since 1912.

Nearly all Cushing crude is going to Independent refineries.

NORTH LOUISIANA PRODUCTION FALLS AWAY FOR THE FIRST TIME IN HISTORY

Market Changes for Year 1916.

NORTHWESTERN LOUISIANA.

	Caddo				De Soto	Crichton
1916.	38 and above.	35 to 37.9	32 to 34.9.	Heavy, crude.	Light.	Light.
January 28	$1.30	$1.20	$1.15	$0.90	$1.20	$0.95
March 8	1.40	1.30	1.25	.90	1.30	1.00
March 15	1.45	1.35	1.30	.90	1.35	1.05
March 27	1.55	1.45	1.40	.90	1.45	1.05
June 15	1.55	1.45	1.40	.90	1.45	.90
June 24	1.55	1.45	1.40	.90	1.45	.80
July 15	1.55	1.45	1.40	.80	1.45	.70
July 25	1.45	1.35	1.30	.70	1.35	.70
July 29	1.45	1.35	1.30	.65	1.35	.65
August 1	1.35	1.25	1.20	.65	1.25	.65
August 2	1.25	1.15	1.10	.65	1.15	.65
August 8	1.15	1.05	1.00	.65	1.05	.65
August 14	1.05	.95	.90	.65	.95	.65
August 17	.95	.85	.80	.65	.85	.65
August 20	.90	.80	.75	.65	.80	.60
December 2	1.00	.90	.85	.65	.90	.60
December 4	1.00	.90	.85	.65	.90	.70
December 14	1.10	1.00	.95	.75	1.00	.80
December 19	1.20	1.10	1.05	.75	1.10	.90
December 27	1.30	1.20	1.15	.85	1.20	1.00
December 29	1.40	1.30	1.25	.85	1.30	1.10

Shreveport, La., Jan. 7, 1917.

For the first time in the history of the North Louisiana field the production failed to show an increase, and instead was nearly 3,000,000 barrels short of the amount produced in 1915. During the first few months of the year the output of the Crichton field helped to hold up the general average, but this field proved comparatively shortlived, and its output was reduced in a few months from 40,000 to 10,000 barrels daily.

Subsequent development in Red River parish caused the decision that the limits of the Crichton pool had been sharply defined, and a revival of interest followed in the old Caddo field, which had been long neglected, but now became again the chief center of interest. No important pools were discovered, however, and the production continued to decline throughout the year.

A remarkable amount of wildcatting has been in progress during the past year, which, while resulting in no sensational developments, have developed numerous showings of oil and gas in various localities which serve as convincing arguments that oil is present in nearly every parish in the northern half of the State, and it only remains to locate the pools.

Extension of Fields.

A number of interesting extensions of the field were made during the year, chief among which were the Grand Bayou district, between Naborton and Crichton, in De Soto and Red River parishes, and the territory south of Ferry Lake and west of Mooringsport, in Caddo parish. Both of these districts have added materially to the new production of the field and serve to emphasize the belief that the limits of the pools have by no means been defined, but are still capable of indefinite extension. In a direct line south of the old Caddo field there are two localities which give promise of important future development, one in the vicinity of Bethany, La., in Caddo parish and Panola county, Texas, and the other further south in the Logansport district, partly in De Soto parish and extending over into Shelby county, Texas. Several small pumpers of remarkable high grade oil have been completed in these localities, and the work of exploring has been taken up by the big companies and by independent operators, backed by strong financial interests.

Another territory of particular interest is in what is known as the Black Lake district, south and east of Red River development, in Natchitoches and Winn parishes. Numerous tests were made in this locality during the past year with decidedly encouraging results, but financial embarrassment in most cases caused the temporary abandonment of these wells, and it is only recently that the work of exploring in this territory has been taken up seriously by big financial interests. Monroe, La., is also regarded as the center of a possible oil field, and important development is in progress in Morehouse and Ouachita parishes, with prospective extensions into Caldwell and Richland parishes. Enough gas has already been obtained to supply the city of Monroe with a fuel supply, and the work of laying the lines for this purpose is now under way.

Two Enormous Gas Fields.

Of incalculable benefit to the State of Louisiana has been the discovery during the past year of two enormous gas fields, one in Caddo parish just south of Shreveport, and the other in Bossier parish, fifteen miles further south. It was a common occurrence during the early part of the year for gas wells to be brought in in this territory having an initial production of from 30,000,000 to 50,000,000 cubic feet per day. As there was no pipeline to the Bossier field, and consequently no market for the gas, the wells were all capped immediately on completion, and there are at present approximately half a billion cubic feet of gas awaiting a market. At one time plans were perfected and the project financed for piping this gas to Houston, Tex., but the shortage of pipe at this time prevented its consummation and the plan is still held in abeyance. As soon as pipe can be secured lines will be laid from the Bossier field to Shreveport, and the Potter Palmer interests of Chicago, which own much of this gas supply, and have bought up one of the largest and most flourishing gas companies in the State as a nucleus, will market the production either here or in other States, according to the demand. Every effort is being made to induce factories to locate in this vicinity with cheap fuel as a slogan, and it is to be hoped that the wonderful fuel supply will be conserved to the uses of its native state.

New Production.

New production obtained from operations in the North Louisiana field during the year 1916 aggregated 55,930 barrels from completions numbering 550. This was a decrease of 146,870 barrels from that of 1915. Of these completions, 150 were dry holes and 60 gas wells, leaving only 340 producing wells. Following is a summary of operations in the North Louisiana field for the year 1916:—

Operations for the Year.

	Comp.	Initial prod.	Dry.	Gas.
Caddo	275	16,700	45	25
N. E. Texas	20	750	13	..
Bossier	25	100	12	10
De Soto	70	15,700	30	10
Red River	125	22,650	25	8
Wildcats	35	30	25	7
1916	550	55,930	150	60
1915	475	202,800	90	25
	75	146,870	60	35

Although the figures show an increase in the amount of development during the past year, production figures failed to show a proportionate improvement and the quantity of oil produced was 2,882,412 barrels less than that of the previous year. Following is a table showing the production of the North Louisiana field, including Northeastern Texas, for 1916, by months:—

Production for the Year.

	Caddo, light.	Caddo, heavy.	De Soto & Red River.	Total.
Jan.	365,393	59,976	679,028	1,104,397
Feb.	361,550	59,605	640,080	1,061,235
Mar.	368,060	57,890	617,750	1,043,700
April	452,620	74,900	726,180	1,253,700
May.	465,650	71,120	556,528	1,093,298
June.	402,185	75,845	520,450	998,480
July.	506,520	88,410	565,383	1,160,313
Aug.	395,045	67,249	393,911	856,205
Sept.	464,240	80,990	443,418	988,648
Oct.	362,110	62,090	327,565	751,765
Nov.	359,730	59,920	309,645	729,295
Dec.	440,020	73,780	353,465	867,265
1916				11,848,301
1915				14,730,713
				2,882,412

The average price paid for oil during the past year was $1.25 per barrel for the best grade of Caddo light and 80 cents for Caddo heavy, with intervening grades in proportion. From March until July the highest price ever paid for oil in the North Louisiana field was maintained, but late in July credit balances began to totter and six cuts made during the month of August brought the price of high grade Caddo oil down to 90 cents and heavy oil to 65 cents, these prices being maintained until early in December. On December 2 the first advance was made, followed by four others, until on December 29 the price was again within 15 cents of its highest record.

GULF COAST CRUDE PRODUCTION IN 1916 ESTIMATED TO HAVE BEEN 21,848,115 BARRELS

The total production of crude petroleum in all districts of the Gulf Coast division in 1916 is estimated at 21,848,115 barrels, an increase of nearly a million and a half barrels over the total output of 1915. Of this amount the South Louisiana fields included in this division contributed 3,821,105 barrels and the South Texas fields 18,027,010 barrels. These figures represent the gross output, including the quantity of oil consumed as fuel in drilling and operating leases. Humble and Sour Lake furnished the greater part of this production, Humble producing 10,322,270 barrels and Sour Lake 4,888,885.

Towards the close of the year there was a noticeable increase in the production of Edgerly and Vinton, while the entrance of Goose Creek as a deep sand district had increased the production of that field to five times the amount produced at the beginning of the year. In the South Texas fields Sour Lake shows an increase of 721,826 barrels for the year, Batson 90,308 and Markham 45,585 barrels. Humble fell off 757,900 barrels, there being a gradual decline in the production of this field from early in the year. Saratoga declined 47,293 and Spindletop shows a decline of 35,096 barrels and at the close of the year had no rigs running. In the South Louisiana fields Vinton shows a gain of 553,210 barrels over the figures of 1915, Edgerly 155,803, Jennings 244,711 and Ainse la Butte 13,007 barrels. The only district in this section of the Gulf Coast fields showing a decrease in production being Welsh with a decrease of 4,732 barrels. The total increase in the South Louisiana fields was 962,000 barrels and the Texas fields 530,856.

No New Fields but Wildcat Work Increases.

No new fields were discovered in 1916, but wildcat work has been more active than ever before. Most of the older companies are testing out new territory, and at the close of the year this work is most active in Harris, Brazoria, Jefferson, Orange, Chambers, Hardin and Liberty counties, South Texas, while considerable wildcatting is being done in Calcasieu and Iberia parishes in South Louisiana.

Interest centered at Humble during the early months of the year. At the close of April there were 80 rigs running and half as many more derricks up at new locations. About this time the center of operations in this field shifted in the deep sand territory from the northern part of the Stevenson survey to the south line of the Landslide and Stevenson.

Deep drilling was a feature of all coastal fields for 1916. At Humble it did not result in gushers of the production of 1915 nor extend the field to any great extent. At Batson a new deep sand was found on the Millholme northwest of old production. At Markham deep tests at the close of the year were being drilled to the south, north and northeast of the old field. At Vinton the field was extended a few hundred feet to the north and northeast, deeper drilling at Edgerly during the year has been profitable, there being now seven developed producing strata in this district.

Deeper drilling resulted in rich pay at Sour Lake. At the close of the year drilling was active in this field north and south of the Texas Company's 900-acre fee tract, producing wells being completed at depths ranging from 2,600 to 3,500 feet. Deeper drilling in Goose Creek resulted in putting that old field in the gusher class, which event was the most striking feature of Gulf Coast developments during the year.

Decline in Drilling Operations.

In June all coastal fields showed a decline in drilling operations caused by the weakness in the market of crude oil, the pipeline companies refusing to take new production at more than the credit balance prices because of flush production of light grade fields in Oklahoma. By the first of July drilling in Humble had fallen off one-third within thirty days, and the center of activity shifted to Batson, Sour Lake and Markham. About this time renewed interest was manifested at Goose Creek where new interests began on deep tests to see if there was a deep sand. On August 23 a test was completed around 2,000 feet by the American Production Corporation No. 1 Gaillard, an old well of the Churchill Oil Company having been deepened. This came in a gusher with an initial flow estimated at 10,000 barrels and caused great excitement. Preparations had not been made for so great a well, and as it could not be brought under control, large quantities of oil were lost. This well soon sanded up and it was some time before it began to flow steadily. The completion of this well caused the center of activity to shift to Goose Creek, and at the close of the year this field holds the interest of oil operators.

Big Gushers Brought In.

Several other gushers have been completed in this district, the second being No. 1 Gillette completed by C. T. Rucker on October 13, with an initial flow of 5,000 barrels. This, like the first gusher, frequently sanded up, and at one time it developed into a gasser of 30,000,000 cubic feet open flow daily and flowed thus for several days and then went back to oil. At the close of the year the two first gushers were pumping a few hundred barrels daily. Several good wells were completed in this district near the close of the year, the largest being a joint test by the Humble and Paraffine companies on the Gillette, completed in December, with an initial flow of 7,000. The pay is found in this field at depths from 2,000 to 2,600 feet. In January of 1916 there was no new production in this field, February but 50 barrels. In December the new production was 9,150 barrels. There are over 50 rigs operating at the close of the year, with many deep tests near completion. All available land has been leased up, and large sums of money has changed hands in the transfer of leases.

Many big deals have been consummated and many acres of submerged land placed under lease with outstanding tests miles away from present production. All the large companies have entered the field, the Gulf Production Company taking over valuable holdings at the close of the year. The Magnolia, Producers' and many other prominent oil companies have valuable holdings and are developing the same. Pipelines have been laid, storage tanks built, and wharves are under construction at the close of 1916.

During the closing months of 1916 a steady influx of outside capital, especially Eastern, was very noticeable. This, with the big advances in credit balance quotations during December, and additional pipelines being laid, new refineries being built, added facilities for shipping and storage of crude, indicates great activity in all fields during the coming year.

Sour Lake Second in Production.

Sour Lake ranks second in amount of production in this division, showing a steady increase throughout the year. Many large wells were completed, notably in October and December. No. 14 on the Hardin county oil lands, completed late in December by the Humble-Gulf oil companies, had an initial flow of 10,000 barrels.

Early in January the Gulf Refining Company completed a large well at Vinton, No. 27 Gardner-Noble-Gray, making an initial production of 10,000 barrels, about half of which was water. A few days later the same company completed No. 19 Vincent, making 12,000 barrels, half water. Another large well was completed in this month with an initial flow of 9,000 barrels, also part water. The initial production for this field for January was 27,500 barrels. In March the Gulf Refining

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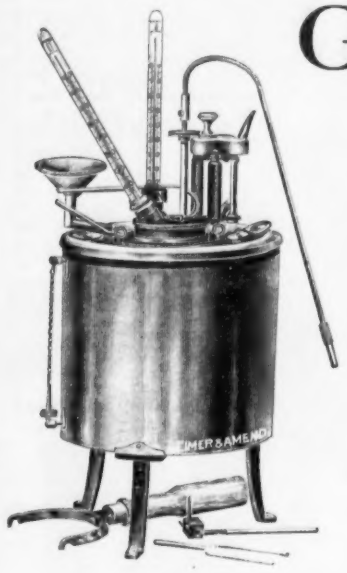

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Company completed a well of 7,000 barrels' production. None so large was completed in the remaining months of the year, although some good wells of from 1,000 to 2,500 barrels were completed at different periods. Edgerly also produced good wells throughout the year, showing an increase in new production for the year of 15,000 barrels over 1915.

The greatest activity at Batson for the year was from April to August. This was caused by deep sand development northwest of old production. In April a 600-barrel well was completed on the Millholme and a 1,000-barrel well on the Kirby by the Gulf Production Company. In June the Sun Company brought in a 400-barrel well on the Millholme, and the Humble Oil Company and Buchannon & Fitzsimmons a 1,600-barrel well also on the Millholme. By July new work had doubled, but late completions in the deep sand in this part of the field were disappointing, and at the close of the year no additional wells of the gusher class had been completed.

Markham Active During Year.

Operations were more active in the Markham field at the beginning of the year than for two years previous; this activity continued throughout the year, although but one large well was completed during the year. In January there were six rigs running, three of which belonged to the Producers' Oil Company. At the close of the year 10 rigs were running or at new locations. Early in the year the Fairchild Oil Company (Doheny interests) entered the field with the purpose of giving it a thorough trying out to the south of production. Two tests were put down on the Hudson land and abandoned. Operations were then shifted by this company to the tract of E. S. Smith, also south of production, and at the close of the year this company had two deep tests drilling, No. 1 changing to cable tools, and derricks for two more. These tests are to be deep, going to a depth of 5,000 feet if necessary. The Clem Oil Company has been active throughout the year in this field, completing a flowing well in June of 5,000 barrels production.

A month later it was flowing about 500 barrels. This was the only well of note completed in this field during the year. The total new production was 5,690 barrels. At the close of the year the Producers' were drilling a deep test on the Gray, one north of the field.

Saratoga and Spindletop.

Small wells were completed at Saratoga during every month of the year; the total initial production of these was a little over 2,000 barrels, slightly less than the amount produced in 1915.

There were 22 producing wells completed during the year at Spindletop, with a total new production of 922 barrels, 722 barrels more than the amount produced during the preceding month. At the close of the year there were 10 operating in this field. The total amount of oil produced in this field declined 35,095 barrels from that produced in 1915.

Production for the Year.

In the tables below will be found the production of the different districts of the Gulf coast division by months for 1916, together with the annual production of each district for 1915:—

SOUTH TEXAS.

1916.	Batson.	Goose Creek.	Humble.
January	54,265	13,970	1,315,650
April	57,630	14,365	904,470
May	68,420	18,150	912,855
June	69,400	21,885	718,245
July	58,270	22,245	713,430
August	62,945	29,880	662,365
September	65,770	159,055	555,620
October	77,345	65,445	783,770
November	72,630	88,560	780,915
December	67,335	96,385	733,580
Totals	759,295	558,835	10,322,270
Totals, 1915	668,987	122,817	11,080,170
February	51,260	14,215	1,145,720
	90,308	436,018	757,900

1916.	Markham.	Saratoga.	Sour Lake.
January	15,580	68,455	375,320
February	10,375	64,115	317,465
March	12,110	72,460	322,490
April	11,755	61,425	327,690
May	17,365	67,050	425,090
June	19,960	58,140	465,660
July	17,765	55,950	421,270
August	14,100	54,840	383,610
September	16,840	50,185	398,470
October	15,365	60,480	400,825
November	12,670	58,275	490,865
December	11,440	66,425	389,320
Totals	173,355	735,800	4,888,885
Totals, 1915	127,770	783,093	4,167,059
	45,585	47,293	721,826

1916.	Spindletop.	*All others.	Total.
January	28,435	21,450	1,893,125
February	27,535	19,080	1,649,715
March	36,480	19,895	1,537,790
April	31,540	19,240	1,518,115
May	29,800	21,370	1,560,910
June	29,625	19,720	1,401,465
July	29,130	20,435	1,338,495
August	30,190	19,685	1,257,615
September	27,960	18,730	1,301,630
October	28,145	19,150	1,448,525
November	26,320	18,685	1,518,920
December	27,455	19,765	1,600,705
Totals	351,415	237,155	18,027,000
Totals, 1915	386,511	162,375	17,496,154
	35,096	74,780	530,856

*Includes following districts, with approximate daily production:—Duval county, 200 barrels; Orange county, 50; Dayton, 100; San Antonio, 150; Matagorda county, 15; Brazoria county, 200 barrels.

SOUTH LOUISIANA.

1916.	Ansel la Butte.	Edgerly.	Jennings.
January	3,720	104,935	32,610
February	3,340	118,380	31,440
March	5,280	112,685	38,365
April	4,375	117,135	42,910
May	3,880	121,400	50,290
June	3,215	126,650	55,635
July	2,925	112,310	53,515
August	2,720	115,675	52,150
September	2,415	126,170	49,715
October	1,690	122,635	53,350
November	1,385	148,730	50,645
December	1,210	149,625	44,530
Totals	36,155	1,476,330	555,125
Totals, 1915	23,148	1,329,527	310,413
	13,007	155,803	244,712

1915.	Vinton.	Welsh.	Total.
January	242,760	2,945	386,970
February	258,390	2,805	314,355
March	181,615	1,960	289,905
April	134,170	1,735	300,325
May	137,560	1,680	314,780
June	125,455	1,415	312,370
July	135,855	1,670	309,275
August	113,350	1,650	285,445
September	121,725	1,650	301,675
October	132,350	310	310,335
November	156,335	685	357,780
December	141,396	1,130	337,890
Totals	1,733,960	19,535	3,821,025
Totals, 1915	1,180,750	24,267	2,859,105
	553,210	4,732	962,000

Total Production.

	Barrels.
Total production all Gulf coast division, for 1916	21,848,115
Total production all Gulf coast division, for 1915	20,355,259
Increase, 1916	1,492,856

New Production and Wells.

There was an increase in matter of new production and number of wells completed in most of the different districts of the Gulf coast division during the year 1916. The total number of all wells completed in this division was 1,163, an increase of 423 over the figures of 1915. Of these 731 were producing wells and 412 abandonments, an increase for the year of 271 producers and 132 non-producers. The total initial production of these wells was 488,640 barrels, an increase of 64,404 barrels from the previous year. Humble had the largest number of completions and greatest amount of new production, having 313 producers and 164 abandonments, a total of 480 completions, with total initial production of 275,920 barrels, which was 26,730 barrels less than the amount produced in 1915. The wells completed in this field in 1916 averaged less in matter of new production than those completed during the previous year, there being 134 more producing wells completed in 1916, with an increase of 102 dry holes and 237 less completions than in 1915.

Sour Lake had an increase in new production of 26,635 barrels, with 6 more completions, 11 more producers and 17 less dry holes.

The new production at Vinton was increased 40,145 barrels; the number of completions varied but a few barrels for the two years.

Edgerly had 8,526 barrels less new production, with 6 less completions.

Goose Creek had 23,300 barrels new production from a total of 50 wells completed during the year, an increase in new production of 22,440 barrels and 41 completions.

There was an increase of 50 producers at Batson and 9,391 barrels new production.

Markham had an increase of 2,825 barrels new production, Spindletop 376 barrels and 23 completions, while Jennings declined 1,495 barrels and Saratoga 1,432 during the same period.

Drilling Operations for 1916.

The following table is a synopsis of drilling operations for the year 1916, showing the total number of wells completed, number of producing wells, dry holes and total quantity of maximum new production developed in the Gulf coast division during the year:—

Districts.	Oil.	Dry.	Total.	New production.
Batson	72	16	88	10,859
Edgerly	43	5	48	39,750
Goose Creek	33	17	50	23,300
Humble	316	164	480	275,920
Jennings	25	12	37	4,895
Markham	13	7	20	5,690
Spindletop	22	12	34	922
Saratoga	52	12	64	2,050
Sour Lake	113	22	135	61,495
Vinton	31	11	42	62,790
Miscellaneous	31	134	165	969
Totals, 1916	731	412	1,163	488,640
Totals, 1915	460	280	740	424,236
Increase	271	132	423	64,404

Detailed Summary for Year.

The following tables give the total new production, total completions, number of dry holes and number of producing wells in all districts of the Gulf coast division during 1916:—

BATSON.

Month.	Oil.	Dry.	Total.	New production.
January	3	..	3	50
February	4	1	5	40
March	6	1	7	94
April	11	..	11	1,690
May	5	..	5	80
June	6	2	8	3,550
July	7	2	9	1,020
August	11	1	12	3,100
September	9	1	10	540
October	3	3	6	270
November	4	5	9	380
December	3	..	3	45
Totals, 1916	72	16	88	10,859
Totals, 1915	30	10	40	1,121
Difference	42	6	48	9,138

EDGERLY.

Month.	Oil.	Dry.	Total.	New production.
January	2	..	2	25
February	3	1	4	2,650
March	3	1	4	5,500
April	4	..	4	4,950
May	2	..	2	3,200
June	3	1	4	3,700
July	3	..	3	2,050
August	7	..	7	3,950
September	4	..	4	3,690
October	2	2	4	310
November	7	..	7	4,850
December	3	..	3	4,875
Totals, 1916	43	5	48	39,750
Totals, 1915	33	5	38	23,750
Difference	10	..	10	15,000

GOOSE CREEK.

Month.	Oil.	Dry.	Total.	New production.
January	1	1	1	..
February	1	1	2	50
March	1	2	3	400
April	3	..	3	265
May	3	..	3	900
June	5	2	7	735
July	2	2	4	225
August	3	1	4	1,650
September	1	1	2	400
October	2	..	2	2,600
November	9	5	14	6,925
December	7	2	9	9,150
Totals, 1916	37	17	54	23,300
Totals, 1915	4	3	7	465
Difference	33	14	44	22,835

HUMBLE.

Month.	Oil.	Dry.	Total.	New production.
January	26	13	39	44,900
February	26	14	40	53,090
March	43	7	50	57,675
April	33	14	47	18,440
May	56	38	94	50,245
June	29	16	45	20,500
July	26	16	42	3,485
August	18	8	26	1,740
September	17	13	30	8,020
October	15	2	17	9,785
November	10	8	18	1,520
December	17	15	32	6,520
Totals, 1916	316	164	480	275,920
Totals, 1915	133	59	192	294,490
Difference	173	115	288	10,570

JENNINGS.

Month.	Oil.	Dry.	Total.	New production.
January	1	1	2	40
February	1	1	2	100
March	1	..	1	100
April	3	..	3	725
May	2	..	2	60
June	4	3	7	1,615
July	3	2	5	850
August	2	2	4	450
September	2	1	3	250
October	2	2	4	175
November	2	..	2	400
December	2	..	2	130
Totals, 1916	25	12	37	4,895
Totals, 1915	16	6	22	4,390
Difference	9	6	15	505

MARKHAM.

Month.	Oil.	Dry.	Total.	New production.
January	..	..	..	..
February	..	..	..	..
March	1	..	3	10
April	2	..	2	235
May	5	..	5	215
June	1	1	2	5,000
July	1	1	2	75
August	1	2	3	25
September	..	..	..	..
October	1	..	1	60
November	..	..	..	..
December	1	1	2	70
Totals, 1916	13	7	20	5,690
Totals, 1915	6	4	10	3,375
Difference	7	3	10	2,715

SPINDLETOP.

Month.	Oil.	Dry.	Total.	New production.
January	..	..	..	..
February	4	..	4	47
March	2	2	4	40
April	3	1	4	65
May	2	2	4	235
June	2	..	2	60
July	1	3	4	8
August	3	2	5	170
September	2	..	2	175
October	2	..	2	100
November	1	1	2	25
December	..	1	1	..
Totals, 1916	22	12	34	922
Totals, 1915	5	5	10	300
Difference	17	7	24	722

SARATOGA.

Month.	Oil.	Dry.	Total.	New production.
January	5	2	7	110
February	3	4	7	100
March	4	2	6	105
April	10	2	12	188
May	8	1	9	360
June	4	..	4	95
July	3	1	4	415
August	4	..	4	320
September	4	..	4	40
October	1	..	1	20
November	4	..	4	80
December	2	..	2	225
Totals, 1916	52	12	64	2,050
Totals, 1915	32	12	44	2,210
Difference	20	..	20	160

SOUR LAKE.

Month.	Oil.	Dry.	Total.	New production.
January	6	1	7	4,275
February	8	..	8	2,525
March	7	2	9	2,465
April	13	2	15	2,930
May	10	5	15	3,460
June	8	1	9	6,500
July	13	1	14	8,990
August	10	2	12	3,815
September	6	..	6	2,775
October	11	3	14	10,550
November	12	4	16	3,450
December	9	1	10	10,050
Totals, 1916	113	22	135	61,495
Totals, 1915	98	42	140	23,530
Difference	15	20	5	37,965

VINTON.

Month.	Oil.	Dry.	Total.	New production.
January	3	1	4	27,540
February	5	..	5	9,450
March	4	1	5	14,700
April	2	1	3	400
May	..	2	2	..
June	4	2	6	800
July	2	1	3	2,000
August	2	1	3	450
September	2	1	3	3,100
October	4	..	4	1,700
November	2	..	2	50
December	1	1	2	2,500
Totals, 1916	31	11	42	62,710
Totals, 1915	22	18	40	8,805
Difference	9	7	2	53,905

MISCELLANEOUS.

Month.	Oil.	Dry.	Total.	New production.
January	10	17	24	180
February	4	14	18	90
March	5	9	14	260
April	2	12	14	95
May	..	9	9	..
June	4	14	18	250
July	3	10	13	20
August	2	13	15	14
September	2	13	15	20
October	2	10	12	40
November	..	5	5	..
December	..	8	8	..
Totals, 1916	31	134	165	969
Totals, 1915	13	90	103	415
Difference	18	44	62	554

Credit Balance Quotations.

The following table shows the changes in credit balance quotations by months for the year 1916, as posted by the Gulf Pipe Line Company:—

Month.	Batson. Cents.	Goose Creek. Cents.	Humble. Cents.
January	60, 70, 80	60, 65	60, 70, 80
February	80	65	80
March	80	65	80
April	80	65	80
May	80	65	80
June	80	65	80
July	80, 70, 65	65	80, 70, 65
August	65	65	65
September	65	65	65
October	65	65	65
November	65	65	65
December	{75, 80 / 90, $1	75, 80 / 90, $1	75, 80 / 90, $1

Month.	Dayton. Cents.	Saratoga. Cents.	Sour Lake. Cents.
January	70	60, 70, 80	60, 70, 80
February	70	80	80
March	70	80	80
April	70	80	80
May	70	80	80
June	70	80	80
July	65	80, 70, 65	80, 70, 65
August	65	65	65
September	65	65	65
October	65	65	65
November	65	65	65
December	{75, 80 / 90, $1	75, 80 / 90, $1	75, 80 / 90, $1

Month.	Spindletop. Cents.	Edgerly. Cents.	Jennings. Cents.
January	65, 75, 85	50, 60, 70	60, 70, 80
February	85	70	80
March	85	70	80
April	85	70	80
May	85	70	80
June	85	70	80
July	85, 75, 70	70, 65, 60	80, 70, 65
August	70	60	65
September	70	60	65
October	70	60	65
November	70	60	65
December	{80, 85 / 95, $1.05	70, 85 / $1	75, 80 / 90, $1

Month.	Vinton. Cents.	*Markham. Cents.
January	60, 70, 80	60, 70
February	80	70
March	80	70
April	80	70
May	80	70
June	80	70
July	80, 70, 65	70, 65
August	65	65
September	65	65
October	65	65
November	65	65
December	{75, 80 / 90, $1	65, 75

* Posted by Texas Company.

NORTH AND CENTRAL TEXAS.

There was a total of 630 wells completed during 1916 in North and Central Texas, an increase of 337 from 1915. Of these 515 produced oil, the remaining 115 were dry holes. This was an increase from the previous year of 309 producers and 30 dry holes. The total initial production of this section of the State was 54,740 barrels for 1916, more than six times the amount produced the year before, or an increase of 46,682 barrels.

Wichita county furnished the greater amount of new production, there being 40,190 barrels produced in this county during the year, an increase of 36,770 barrels, nearly twelve times the amount produced in 1915.

There were 264 wells completed in this county during the year, of which 230 were producers, an increase of 144 producers and total increase of 159 completions. Burkburnett produced 31,110 barrels new production, which was 9,030 barrels more than the amount produced in 1915. There were 201 completions, of which 169 were producers, an increase of 145 completions and 122 producers.

In Clay county there were 26 completions, 18 more than that of the previous year, with a total new production of 600 barrels, an increase of 327 barrels. In other districts, including Thrall, Moran, Strawn and others, there was a total of 2,840 barrels new production, an increase of 555 barrels.

There were 139 completions, of which 97 were producing wells, an increase from 1915 of 15 completions and 29 producers.

Production for 1916.

In the tables below will be found the production of the different districts of North and Central Texas by months for 1916:—

1916.	Electra.	Burkburnett.	Petrolia.	Iowa Park.
Jan.	428,000	124,630	34,675	1,890
Feb.	378,725	132,685	32,145	1,775
March	380,630	114,610	28,780	1,820
April	440,735	138,720	27,140	1,765
May	541,990	190,240	26,750	1,680
June	610,575	183,450	25,720	1,755
July	665,750	191,645	25,650	1,570
Aug.	636,000	192,560	23,425	1,315
Sept.	540,280	195,715	24,890	1,585
Oct.	583,860	230,545	25,275	1,520
Nov.	501,365	210,330	23,480	1,490
Dec.	604,780	206,895	24,765	1,535
Total	6,463,380	2,088,025	322,665	19,700

1916.	Corsicana.	Moran.	Strawn.	Thrall.
Jan.	29,715	13,865	8,620	91,915
Feb.	29,990	11,685	11,755	58,680
March	31,325	12,220	13,515	50,620
April	28,420	15,235	14,870	53 4 5
May	29,970	16,960	15,620	45,880
June	27,380	16,450	13,870	32,540
July	26,890	12,975	13,930	50,310
Aug.	25,470	11,990	15,645	33,325
Sept.	25,645	13,322	14,655	27,195
Oct.	26,115	12,420	8,790	23,070
Nov.	26,715	13,560	9,445	20,810
Dec.	26,780	12,885	10,325	19,765
Total	333,385	163,570	157,240	507,595

1916	Total.
January	733,370
February	657,410
March	633,580
April	720,370
May	869,060
June	911,740
July	904,720
August	1,000,330
September	843,460
October	887,595
November	896,195
December	907,730
Total	10,055 5 6

Drilling Operations for 1916.

The following table is a synopsis of drilling operations for the year 1916, showing the total number of wells completed, number of producing wells, dry holes and total maximum initial production developed in the year in North and Central Texas:—

Districts.	Oil.	Dry.	Total.	New production.
Wichita county	230	34	264	40,190
Burkburnett	169	32	201	11,110
Clay county	19	7	26	600
*Miscellaneous	97	42	139	2 840
Total, 1916	515	115	630	54,740

* Includes Thrall, Moran, Strawn and other North and Central Texas districts.

Summary by Counties.

The following tables give the total new production, total completions, number of dry holes and number of producing wells in all districts of North and Central Texas during 1916:—

WICHITA COUNTY.

Month.	Oil.	Dry.	Total.	New production.
January	13	..	13	1,160
February	14	2	16	785
March	20	5	25	1,790
April	50	1	51	3,010
May	27	2	29	2,915
June	26	2	28	8,885
July	19	7	26	8,810
August	11	4	15	1,440
September	19	4	23	1,700
October	11	2	13	985
November	12	2	14	3,440
December	28	3	31	5,270
Totals, 1916	230	34	264	40,100
Totals, 1915	86	19	105	3,420
Difference	144	15	159	6,770

BURKBURNETT.

Month.	Oil.	Dry.	Total.	New production.
January	5	2	7	275
February	11	..	11	630
March	9	2	11	660
April	11	5	16	850
May	19	2	21	1,620
June	23	3	26	1,595
July	14	3	17	920
August	4	1	5	265
September	13	3	16	420
October	17	4	21	615
November	19	4	23	580
December	24	3	27	2,460
Totals, 1916	169	32	201	11,110
Totals, 1915	47	9	56	2,080
Difference	133	23	145	9,030

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CLAY COUNTY.

Month.	Oil.	Dry.	Total.	New production.
January	2	..	2	175
February	..	1	1	..
March	1	..	1	10
April	3	..	3	25
May	2	..	2	20
June	..	1	1	..
July	1	..	1	15
August	3	1	4	60
September	2	1	3	35
October	..	..	..	..
November	1	1	2	20
December	4	2	6	240
Totals, 1916	19	7	26	600
Totals, 1915	7	1	8	273
Difference	2	6	18	327

*MISCELLANEOUS.

Month.	Oil.	Dry.	Total.	New production.
January	5	5	10	80
February	11	3	14	325
March	6	8	14	90
April	5	1	6	300
May	12	4	16	110
June	7	4	11	225
July	6	4	10	150
August	7	3	10	120
September	8	4	12	230
October	4	4	8	215
November	9	1	10	285
December	15	3	18	710
Totals, 1916	97	42	139	2,840
Totals, 1915	68	56	124	2,285
Difference	29	6	15	555

*Includes Thrall, Moran, Strawn and other North Texas and Central Texas districts.

Prices During Year 1916.

The following table shows the changes in credit balance quotations in North and Central Texas fields by months for the year 1916, as posted by the Magnolia Petroleum Company:—

	Corsicana Light.	Corsicana Heavy.
January	$1.20, $1.25	$0.60, $0.65
	$1.30	$0.70, $0.75
February	$1.30	$0.75
March	$1.30, $1.40	$0.75, $0.80
	$1.45, $1.55	
April	$1.55	$0.80
May	$1.55	$0.80
June	$1.55	$0.80
July	$1.55, $1.45	$0.80, $0.70
	$1.25, $1.15	$0.50, $0.45
August	$1.05, $0.95	$0.40
	$0.90	
September	$0.90	$0.40
October	$0.90	$0.40
November	$1.00	$0.45
December	$1.10, $1.20	$0.50, $0.60
	$1.30	$0.70

	Electra and Henrietta.	Strawn.
January	$1.20, $1.25	$1.05, $1.30
	$1.30	
February	$1.30	$1.30
March	$1.30, $1.40	$1.45, $1.55
	$1.55	
April	$1.55	$1.55
May	$1.55	$1.55
June	$1.55	$1.55
July	$1.45	$1.45
	$1.25, $1.15	$1.25, $1.15
August	$1.05, $0.95	$1.05, $0.95
	$0.90	$0.90
September	$0.90	$0.90
October	$0.90	$0.90
November	$1.00	$1.00
December	$1.10, $1.20	$1.10, $1.20
	$1.30	$1.30

	Moran.	Thrall.
January	$1.05, $1.30	$1.05, $1.30
February	$1.30	$1.30
March	$1.30, $1.40	$1.30, $1.40
	$1.45, $1.55	$1.45, $1.55
April	$1.55	$1.55
May	$1.55	$1.55
June	$1.55	$1.55
July	$1.45	$1.45
	$1.25, $1.15	$1.25, $1.15
August	$1.05, $0.95	$1.05, $0.95
	$0.90	$0.90
September	$0.90	$0.90
October	$0.90	$0.90
November	$1.00	$1.00
December	$1.10, $1.20	$1.10, $1.20
	$1.30	$1.30

drilled to the deep sand. No. 99 Waggoner Ranch, 100 barrels.

Red River Oil Company, No. 71 Bywaters Ranch, 5 barrels in shallow sand at 107 feet, and a remarkable find for that field.

Magnolia Petroleum Company, No. 15 H. and T. C. tract, 100 barrels; No. 22 Hamilton tract, 250 barrels, and No. 46 Putman tract, 100 barrels.

BURKBURNETT FIELD.

W. C. McBride, No. 6 Wm. Thom tract, 175 barrels.

Chenault, Langford & Co., No. 3 Chenault tract, 200 barrels.

Producers' Oil Company, Nos. 3, 4 and 5 Heiserman tract, 200, 250 and 150 barrels.

CLAY COUNTY.

Producers' Oil Company, No. 32 Byers Ranch, 3,000,000 feet of gas.

STRAWN FIELD.

Texas and Pacific Coal Company, No. 25 Stuart tract, 250 barrels.

MAY.

ELECTRA FIELD.

Producers' Oil Company, No. 63 Stringer tract, 700 barrels; No. 2 on the Stringer tract, an old well, drilled deeper and produced 1,500 barrels.

Magnolia Petroleum Company's Nos. 43 and 44 Putnam tract, 750 and 1,000 barrels.

BURKBURNETT FIELD.

Magnolia Petroleum Company, No. 3 Fred Thom tract, 250 barrels.

Wm. C. McBride, No. 7 Wm. Thom tract, 200 barrels.

Shultz Oil Company, No. 5 Shultz tract, 100 barrels.

Producers' Oil Company, No. 7 Heiserman tract, 350 barrels.

McAllister & Co., No. 1 L. Ramming tract, 250 barrels.

JUNE.

ELECTRA FIELD.

Red River Oil Company, No. 1 Bywaters tract, 175 barrels.

Producers' Oil Company, No. 41 Bywaters tract, drilled deeper, 1,500 barrels.

Magnolia Petroleum Company, No. 45 Putman tract, drilled deeper, 1,700 barrels.

BURKBURNETT FIELD.

Gulf Production Company, Heiserman tract, 300 barrels.

STEPHENS COUNTY.

Producers' Oil Company, Parks Ranch, 5,000,000 feet gas.

JULY.

ELECTRA FIELD.

Producers' Oil Company, Nos. 52, 57, 65, 67 and 69 Stringer tract, 300, 1,000, 200, 120, 500 and 100 barrels.

Magnolia Petroleum Company, 47 and 48 Putman tract, 1,800 and 175 barrels.

Red River Oil Company, No. 73 Bywaters tract, 150 barrels.

AUGUST.

BURKBURNETT FIELD.

Producers' Oil Company, Stein Ranch, 15,000,000 feet gas.

Clint Woods' No. 6 Shultz tract, 150 barrels.

Magnolia Petroleum Company, No. 8 Guillette tract, 150 barrels.

SEPTEMBER.

ELECTRA FIELD.

Magnolia Petroleum Company, No. 3 Piper tract, 150 barrels.

Producers' Oil Company, No. 24 Bywaters tract, 300 barrels.

CLAY COUNTY.

Taylor & Minnich, No. 2 Taylor tract, 5,000,000 feet gas.

OCTOBER.

ELECTRA FIELD.

Producers' Oil Company, No. 10 McBurney tract, 100 barrels.

Magnolia Petroleum Company, No. 2 Piper tract, 1,800 barrels; No. 12 Allen tract, 250 barrels; No. 17 H. and T. Co. tract, 250 barrels, and No. 11 Sumner tract, 200 barrels.

BURKBURNETT FIELD.

Gulf Production Company, No. 10 Pratt tract, 325 barrels.

CLAY COUNTY.

Producers' Oil Company, No. 1 Martin tract, 2,500,000 feet gas.

PALO PINTO COUNTY.

Bucher Bros. & Co., No. 1 Taylor tract, 2,000,000 feet gas.

COLEMAN COUNTY.

Robertson & Son, No. 6 Putman tract, 2,500,000 feet gas.

NOVEMBER.

ELECTRA FIELD.

Magnolia Petroleum Company, 25 Hamilton tract, 100 barrels, and No. 28 Allen tract, 1,000 barrels.

Producers' Oil Company, No. 70 Stringer tract, 120 barrels, and No. 123 Waggoner Ranch, 100 barrels.

DECEMBER.

MINERAL WELLS FIELD.

Empire Gas and Fuel Company, Glover tract, 3,000,000 feet gas.

PANHANDLE PRODUCTION GREATER THAN EVER BEFORE IN HISTORY OF THE FIELD

Fort Worth, Texas, Jan. 8, 1917.

A review of the Panhandle-Texas fields during 1916 shows conclusively that it is only a question of time until the vast area covered by the Panhandle section will be one vast oil and gas field. There is much leasing in the west and northwest section of the State, and it looks as though the future supply of crude oil to some extent will be found on the large ranch properties where for many years the thousands of cattle crazed and fattened for the markets in the East. Fine cattle can be seen these days over the ranges, and while little of the land is farmed, it will come in hardy by producing oil and gas in commercial quantities, and some day the ranch owners will realize more heavily from crude oil royalties than they did in the early days from the handling of cattle.

The extensive development that has been in progress during the entire year in North Texas has borne fruit to such an extent that the production of the defined fields is greater by some thousands of barrels than ever in the history of the Panhandle oil development. In the Electra field, in Wichita county, especially, many new wells have been drilled to the deeper sands and have come in good and consistent producers. The new sand discovered early in the year being the most productive of any that has been found in the North Texas field, and a number of wells that have failed in the upper sands, have been drilled deeper, responding with productions varying from 500 to 1,700 barrels daily. Besides these the shallow sands are still furnishing good production. At Burkburnett, also, the production has increased, as the practice which was adopted some time ago of putting in charges of nitro-glycerine has largely increased the output of wells in that field. Much wildcatting has been done with varying success, and the limits of the pool have been extended in nearly every conceivable direction. Fowlkes, Iowa Park and Petrolia have held their own, and the wells in these small pools seem to be long lived producers. The production from there appears to be about the same as it was a year ago, with but few new wells added. Quite a number of wells were drilled to the top of the sand and then shut down, and the cause of this was overproduction earlier in the year.

The extension of the Electra pool to the northwest by the Producers' Oil Company, in Willbarger county; the development on the Tate Waggoner Ranch by Pittsburgh operators, and the extension of the Burkburnett pool to the south, stimulated activity in other sections of Wichita and Archer counties which prior to the development were frowned upon by the oil men to a certain extent.

Extending from Wichita Falls the wildcat operations takes in the Bacon Switch country, where Honest Jack Kelly and associates made their first venture in the North Texas field and lost. This territory has now been leased up and is being tested out.

Wildcatters Never So Busy.

Three years ago Archer county was looked on as an old man's graveyard, but the tombstones of the past do not seem to frighten the speculators of today, who are more than willing to invest twice the amount that the dead ones have buried. For the past year the wildcatter has shown a great deal of activity throughout the Texas Panhandle division, but never to so great an extent as at the present time, and few of the counties of the territory are being overlooked in the search for oil, the recent advances in the price of oil spurring them on to greater activity. Palo Pinto county and the territory surrounding its borders appear to have been more especially selected for this prospecting, and numerous tests are being drilled throughout that locality. Jack, Stephens and Coleman counties are coming in for their share of the test work, as are many other counties before the close of the new year. In Jack county and, in fact, over a vast area of territory in Texas, any variety and depths of pay sand can be discovered. For many years oil has been developed in depth from the "0-foot Jack" county pay to the deep sands of the Gulf Coast pools, and now comes the report that a new pool has been uncovered, with the spade, about twenty-six miles northwest of Wichita Falls, in Wichita county, practically on the surface, and that paying wells can be dug within an hour. Four wells are reported pumping with an aggregate production of 24 barrels daily, and many others are now being dug.

Finished Work for 1916.

In the Panhandle-Texas fields during the year 1916 there were a total of 590 wells finished, the new production being 47,208 barrels, the greatest in the history of the field. There were thirty-five gas wells with a combined open flow gas production of over 350,000,000 cubic feet, and 110 dry holes. This is an increase over the 1915 work of 297 finished wells, 39,150 barrels production, 11 gas wells and 25 dry holes. The work would have been much greater, but the scarcity of water for drilling purposes was a big delay, and earlier in the season the decline in prices of oil stopped a certain amount of work that had been planned. The wells for the year were by months as follows:—

Month.	Comp.	Prod.	Gas.	Dry.
January	32	1,690	3	7
February	42	1,939	3	5
March	50	2,834	6	13
April	56	4,283	4	7
May	66	4,630	6	10
June	65	10,713	..	8
July	53	9,876	4	14
August	34	1,905	4	9
September	54	2,366	2	12
October	43	1,899	1	10
November	46	4,303	..	7
December	49	1,151	2	8
Totals	590	47,208	35	110
For 1915	293	8,058	24	85
Difference	297	39,150	11	25

Increase, finished wells, 297.
Increase, production, 39,150 barrels.
Increase, gas wells, 11.
Increase, dry holes, 25.

Pipeline Conditions.

The runs, deliveries and stocks for the first eleven months of 1916 in the Panhandle fields were by months as follows:—

Month.	Runs. Barrels.	Deliveries. Barrels.	Stocks. Barrels.
January	501,984	425,284	734,494
February	503,140	483,566	720,813
March	569,690	463,643	798,973
April	584,252	525,733	819,870
May	671,168	595,767	852,507
June	783,137	680,674	841,464
July	857,749	838,597	912,916
August	878,060	885,923	794,231
September	759,257	769,975	699,998
October	699,704	746,695	621,913
November	756,969	769,374	641,100
December	754,679	.....	.....
Totals	8,269,823	7,185,061	.....

During the latter part of February the Panhandle Refining Company completed its refining plant with a 2,000 barrels a day capacity at Wichita Falls, and also completed its pipeline from the Burkburnett field to the refinery. Along in September an addition was pu into the plant which is now capable of refining 3,000 barrels daily, and has been running on full time. During the same month the Wichita Valley Refining Company finished its plant at Iowa Park, with a capacity of 1,000 barrels a day.

In February the Producers' Oil Company and the Corsicana Petroleum Company started making casinghead gasoline in the Electra and Burkburnet fields, and showed about 5,000 gallons a day.

Annual Wells.

The good wells for the year were by counties and fields each month as follows in the Panhandle fields:—

JANUARY.

BURKBURNETT FIELD.

Wm. C. McBride's No. 5 Thom tract, 200 barrels.

FEBRUARY.

ELECTRA FIELD.

Producers' Oil Company's No. 54, 56 and 57 Stringer tract, 225, 300 and 500 barrels, and No. 98 Waggoner Ranch, 150 barrels; No. 1 Heiserman tract, 300 barrels.

Magnolia Petroleum Company's Hickory tract, Burkburnett field, 125 barrels.

Wichita Gas Company's Landrum tract, Clay county, 10,000,000 feet gas.

MARCH.

ELECTRA FIELD.

Magnolia Petroleum Company's' No. 20 Brown Cross tract, 400 barrels, and No. 43 old Indian refinery at Georgetown, Scott Putman tract, 160 barrels.

WILLBARGER FIELD.

Producers' Oil Company's No. 97 Waggoner Ranch, 8,000,000 feet gas.

APRIL.

ELECTRA FIELD.

Producers' Oil Company's Nos. 58, 59, 61 and 64 Stringer tract, 200, 425, 1,200 and 180 barrels, respectively. These wells were

WYOMING 1916 PETROLEUM PRODUCTION 8,030,000 BARRELS—NEW DOMES FOUND

Casper, Wyo., Jan. 7, 1917.

The development of Wyoming's oil resources provided for the most spectacular feature of its industrial progress during 1916. Virtually of negligible importance six years ago, the production of oil at the end of 1916 dominates all other commercial activities of the State. At the close of the year there is feverish activity in at least thirty oil fields in the State, and hundreds of wells are being drilled, yet the State's oleaginously potential area of 20,000 square miles hardly has been scratched. The State of Wyoming during the last year produced 8,030,000 barrels of oil of the estimated refined value of $40,150,000, yet probably less than one-half of the maximum developed production is finding refinery facilities, and this maximum represents but an infinitesimal fraction of the undeveloped possible maximum.

So extensive is the development of Wyoming oil resources which is in progress at the close of 1916 that a concentrated description which would be at all adequate is impossible. Numerous new domes were discovered during the year and now producing and development of the previously discovered oil-bearing areas became much more extensive as the result of the year's activity. As 1917 opens drills are pounding and wells are producing in the following fields:—Big Muddy, Lost Soldier, Elk Basin, Bonanza, Torchlight, Grass Creek, Greybull, Basin, Norwood, Cody, Salt Creek, Meeteetse, Lost Cabin, Manderson, Powder River, Keycee, Le Prele, Moorcraft, Brenning Basin, Big Hollow, Pilot Butte, Sage Creek, Lander, Big Piney, Barter Basin, Spring Valley, Erway, Lusk, Cheyenne River Basin, Rattlesnake Hills, Newcastle, Labonte, Douglas, Plumkett, Cowley, Lovell, Alkali Butte, Buffalo and others. Also drilling rigs are being hurried into other localities which are unproven but suspected fields.

Most Important Discovery Big Muddy Dome.

Perhaps the most important event of the year in the State's oil industry was the discovery of the Big Muddy Dome, lying in Converse and Natrona counties about twenty-five miles from Casper. The first well in that field was drilled in last spring, close to two lines of roalroad the Burlington and Northern, and since that territory bisected by these railroads and by the North Platte River, Wyoming's largest stream, has been developed. Because of the proximity of transportation facilities the development of the Big Muddy field has been unusually rapid. At the close of the year scores of concerns are operating in the field and its producing wells are capable of outputting several thousand barrels daily. The oil comes from two stratas, the Shannon sand, lying between 800 and 1,000 feet beneath the surface, and the Wall Creek sand, lying about 3,000 feet beneath the surface. But one well sufficiently deep to penetrate the Wall Creek sand, that of the Merritt Oil and Gas Company, has been sunk, but this has established that the field may be considered as permanent as any of the older fields of the country. The Merritt well in December was acquired by the Merritt Oil Corporation, a new company, for a consideration said to have been $2,000,000, this being the second largest oil land transaction in Wyoming during the year. Another December deal in the same field was the optioning of the lease of the Elkhorn Oil Company, the pioneer Big Muddy producer, to a New York syndicate, which, if the deal goes through, will pay, it is said, about $600,000 for the property. The Shannon wells of the Big Muddy field produce from 75 to 200 barrels daily. Wall Creek sand wells, it is estimated, will produce 1,000 barrels or better a day. As yet there has been little production in the field, the small output marketed going to the Midwest Refining Company's plant at Casper. The construction of a pipeline to this plant is under consideration, but presents the problem of an upgrade. Late in the year there revived talk of a project to pipe Wyoming oil to Omaha, with the Big Muddy oil substituted for the Salt Creek oil, on which this project originally was based. An Omaha pipeline would be approximately 500 miles in length with a down grade all the way through the valley of the North Platte River. The majority of the strikes which have been made in the Big Muddy field are on lots owned by the State of Wyoming, and the State derives a royalty of one-tenth of all the oil produced from this land. Soon after the discovery of oil the Federal Government withdrew from entry all of the public lands in and adjacent to the field.

Second only in importance to the discovery of the Big Muddy Dome was that of the Lost Soldier Dome, which lies in Carbon county, about forty miles north of Rawlins and at great a distance from the nearest railroad. Many wells have been drilled in that field, but there has been no production because of the absence of transportation facilities. The possible output already developed is sufficient, in all probability, to result in the construction of a pipeline during 1917, either to the Union Pacific Railroad to the south or to the refineries at Casper to the north. The Midwest Oil Company, producing affiliate of the Midwest Refining Company, and the Ohio Oil Company, a producing subsidiary of the Standard Oil Company, both are interested in the Lost Soldier field, as is also a wealthy syndicate composed of Hawaiian and California capitalists. There are also many smaller lease and claim holders. The development of the field, like that of the Big Muddy, was retarded soon after the discovery of the dome by the withdrawal from entry of all the overlying and surrounding public lands.

Other Important Discoveries.

Other important discoveries of new fields during the last year included those of the Powder River Dome, about forty miles west of Casper; the Big Piney Dome in Lincoln county; Pilot Butte Dome in Fremont county; Sage Creek Dome in the Wind River Indian reservation, about twenty miles north of Lander, and several others so widely scattered that they establish that there is no section of Wyoming which may not be regarded as prospective oil producing territory.

The two great producing concerns operating in the State—the Midwest Oil Company and the Ohio Oil Company—the former, as hereinbefore related, being the producing subsidiary of the Midwest Refining Company, and the latter the producing subsidiary of the Standard Oil Company, continued during 1916 their preceedingly established policy of acquiring producing wells wherever possible, and control of the industry in the State lies with them and with their refining affiliates, which is a good thing for the industry, not only of Wyoming, but in every other State in the Union where oil is produced in quantities. They pay the leading prices for the raw product and keep down the price of the refined, which is purchased by the public, and without them prices of oil would be small and refined products high to the public. The immense Midwest and Standard refining plants at Casper and the Midwest refinery at Greybull continued throughout the year to operate at full capacity, the Midwest and Standard plants at Casper handling 14,000 barrels daily and the Midwest plant at Greybull 8,000 barrels daily. The Standard at the close of the year is making rapid progress on a refinery at Greybull which will be operating in the spring of 1917. Throughout the year small refineries at Cowley, Chatham and Spring Valley handled crude oil to the limit of their capacity. The combined output of all refineries in the State is estimated at 8,030,000 barrels, which estimate is conservative.

66,000-Acre Deal the Largest.

The largest oil territory deal in the State in 1916 was the purchase by a Los Angeles syndicate, headed by Morgan Morgan, from Jacob Ervay of 66,000 acres in the Rattlesnake and Dutton basins, for $5,500,000. On this tract, which lies in Natrona and Fremont counties, several hundred test holes have been sunk, these establishing that probably the entire area is oil bearing. Development for production will be undertaken by the California purchasers during 1917, and the Rattlesnake and Dutton basins will become in consequence of the work, it is anticipated, two of the most important oil producing districts of the State.

Although Wyoming crude oil carries the highest per cent. of gasoline content of any produced in quantities in the country, one of the problems which arose during the year was the inability of the State Pure Food, Dairy and Oil Department to compel distributors of gasoline to market a product complying with the high Wyoming test. As a result of this situation the State Commission has recommended to the incoming legislature the enactment of legislation authorizing the establishment of a

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State-owned and State-operated refinery, and further authorizing the State to take over the improvements of lessors on State-owned oil lands at the expiration of the existing leases and to use these lands and this equipment in supplying the proposed State-owned refinery with crude oil. This proposition would be the worst that the State could do, as other States have tested out the matter years ago, and after getting right down to brass tacks, concluded that there was not money enough in the business to warrant the using of State capital for the handling of the business.

Crude Carries 40 to 50 Per Cent. Gasoline.

Wyoming crude oil carries from 40 to 50 per cent. of gasoline, as does some of the other fields in other States, but the output of Wyoming is badly needed at this time by the many automobile owners. It is doubtful if lower prices will be found for gasoline during the new year, and it will not at all be surprising to see the price still higher. The price will be according to the supply and demand, which governs the gasoline business as it does any other commodity.

Interest among the oil producers of Wyoming at the close of the year is largely held by persistent rumors that a merger of the Midwest and Standard refining interests is imminent. The Midwest profits for the year of approximately $7,000,000 have made, so reports go, the larger concern desire to absorb it, and with its great plants and a big estimate reserve of crude in the Salt Creek field alone, and the merger, rumor says, is well along toward consummation. This looks like mere idle talk to an oil man of knowledge, but goes well among those not familiar with oil country talent. The Midwest Refining Company during the year absorbed the Greybull Refining Company by the purchase, it is reported, of the $2,500,000 worth of its outstanding preferred stock, the price being par.

An indication of the magnitude of the oil activity in the State may be gleaned from the fact that during the period from October 1, 1915, to September 30, 1916, articles of incorporation were filed by oil companies, the combined capitalization of which was $47,461,800. This meant the issuance of $130,000—at the par value—of oil stock for each day of the year.

The season of 1916 was the busiest the State has ever seen so far as oil development is concerned, and while there have been still more so had it been possible to obtain casing, tubing and other oil well supplies on short order during the early months of the year. During the season there were three stampedes to new fields, namely, Pilot, Butte, Lost Soldier and the Big Muddy. Upon each of these three fields oil has been found at shallow depths, probably in the equivalent of the Shannon sand of the Salt Creek field. At Big Muddy the deep well obtained oil in the Upper Wall Creek sand at 2,000 feet stratigraphically below the Shannon. At Pilot Butte and Lost Soldier the lower sands have not as yet been tested. Oil has also been obtained at shallow depth, and in a high geologic horizon, on Dry Piney Creek, in Lincoln county, and gas was struck in high sands on the Dry Lake Dome, southeast of Rock Springs.

Second Wall Creek Sand.

Outside of what is termed the most sensational find of the year in the deep well in Big Muddy, the fact must not be overlooked that one of the most important strikes of the entire year was possibly the striking of oil in the Second Wall Creek sand in the Salt Creek field. As the well passed through salt water in the Upper Wall Creek sand, the pool in the second sand proved to be of greater areal extent than the pool in the upper sand. The thickness of the sand is not so great, however. There is at least one more, and possibly two, sands unprospected in the Salt Creek field, which may confidently be expected to prove productive. The life of this great field is certain to be a long one.

Rumor is ever telling of prospective independent refineries at Basin, Riverton, Big Muddy, or Douglas, but up to the present time there is no real promise of competition in the crude oil market. Should the total production of the State increase as rapidly during 1917 as now seems probable, it will be within the realm of reason to expect that an interstate pipeline will be constructed, whereby Wyoming crude oils can reach outside markets without paying the prohibitive railroad freight rates. The price of crude oil will immediately rise upon the construction of such pipeline. It is of interest to know that Wyoming's gasoline is now being shipped by solid train loads to the Eastern States. Also the crude oil is being shipped to a Standard refinery in Western Canada. The State now has gas in four large structures, which may prove to be oil producers from lower horizons, when the lower sands are prospected. Drilling is being done on two of these structures at this time to reach the lower sands. Should these, or either of them, prove to be oil-bearing, the production of the State will be tremendously increased.

Many prospective fields are being drilled or will be drilled in the spring, and several of these may be expected to prove productive. From every point of view the prospects for the development during 1917 are very flattering. All may feel certain that 1917 will bring in more new production than has been brought in during any two years heretofore.

Interesting Figures on Wyoming.

During the past twelve months millions of capital has been invested in the production of petroleum, pipelines and refineries in the State. From a daily production of a few hundred barrels a few years ago, the petroleum industry of the State has developed so rapidly that the present per diem production is probably between 15,000 and 20,000 barrels. Some estimate the production still higher, which would mean an annual production of close to from 12,000,000 to 15,000,000 barrels, but the latter figure presumably is an exaggeration.

The bulk of Wyoming's oil production in 1916 was in the Salt Creek and Shannon fields of Natrona county, the output of which was refined in the big plants of the Midwest Refining Company and the Standard Oil Company of Indiana, at Casper. Other refineries were operated at Cowley, Greybull and Spring Valley. The Midwest Refining Company secures the bulk of the production from the Salt Creek and Shannon fields. The Dallas and Plunket fields in Fremont county have an estimated daily production of 500 barrels. In the Pilot Butte field, in the same county, there is an estimated production of 2,000 barrels a day. The Sage Creek field, north of Lander, in the same county, is making a nice showing. The Grass Creek field in Hot Springs county is reported to show a production of 5,000 barrels a day, and reports from that field is that 30,000 barrels a day could be brought to the surface in that field were there a market and sufficient pipeline facilities to care for the product. The Elk Basin field, in Park county, along the Wyoming-Montana line, and about 14 miles west of Frannie, was practically discovered early in 1916, and is capable of producing close to 7,000 barrels a day from the present wells drilled in. There is considerable production in the Big Horn Basin country, at Greybull Basin, Cowley and the Torchlight fields, so it can readily be seen that there would be but little drilling required to bring the State's production to 50,000 barrels daily, to say nothing of the late fields developed in the Big Muddy field, between Casper and Douglas, the Lost Soldier development, north of Rawlins, and the Powder River territory in Natrona county, and forty spots over the State.

Pipelines Constructed or Under Way.

In the new fields pipelines for conveying the oil production to the railroad or refineries have been constructed, others in course of construction, or now being surveyed. From the Salt Creek and Shannon fields there are two 6-inch pipelines to the Casper refineries, both being in the nighborhood of 50 miles in length. A new line has been put in from the Grass Creek field to the Burlington Railroad at Chattam, and from there the oil is shipped by tank cars to the Greybull refinery. The line is about thirty miles in length, and there is talk now of continuing the line from Chattam to Greybull to connect up to the Greybull Refining Company's recently completed plant, with a daily capacity of 5,000, and the Standard Oil Company of Indiana's plant with the same capacity, now under construction. The Illinois Pipeline Company, an arrival in the field durnig 1916, has put in a line from the Elk Basin district to Frannie, a distance of close to twenty miles from where the oil has been shipped by tank cars to Greybull. This line is expected to be continued onto Greybull the coming summer. Two pipelines have been put in Fremont county. One extends from the Dallas field to the Chicago and Northwestern Railroad at Wyopo, and is ten miles long, and the other, which is a 4-inch line, runs from the Plunkett field a mile east of Wyopo, which is six miles in length. At Wyopo there is storage for 37,500 barrels of crude and 30,000 barrels at Dallas. In the Plunkett field there is storage for 350 barrels. Another line is being projected in Fremont county to run from the new Pilot Butte field to Riverton, or from the field to Lander. There is also a new line under consideration from the Big Muddy field, in western Converse county, to Casper, a distance of about 18 miles.

Wyoming's Oil Production.

The known oil production from the Wyoming fields from 1894 to the present time were, by years, as follows:—

Year.	Production.
1894	2,369
1895	3,455
1896	2,878
1897	3,650
1898	5,475
1899	5,560
1900	5,450
1901	5,400
1902	6,253
1903	8,960
1904	11,542
1905	8,454
1906	7,000
1907	9,339
1908	17,775
1909	20,056
1910	115,430
1911	186,695
1912	1,572,306
1913	2,406,522
1914	4,360,000
1915	5,164,757
1916	8,030,000
Total	21,959,306

The runs for 1916 are estimated.

Past History of Wyoming Oil.

The earliest printed record we find of the knowledge of oil among white men is in Washington Irving's "Captain Bonneville." Captain Bonneville visited the Wind River Valley, and having heard of petroleum springs from the Indians and trappers, he hunted until he found the "tar spring," which marked the present location of the Dallas oil field.

In Stansbury's expedition to Great Salt Lake, written in 1849, we find regarding the petroleum spring at Hilliard, Uinta county, "aspring of petroleum or mineral tar oozes from the low bank of a little rivulet flowing into the valley of Sulphur Creek. The emigrants collected it for medicinal purposes and for greasing their wagon wheels." The Carter Spring, six miles to the west, was discovered about the same time.

In 1863 oil was being collected from a spring near Poison Spider Creek and sold for wagon grease to the emigrants traveling the Moran trail. In the winter of 1883 the cattlemen in the Big Horn Basin ran short of lamp oil and used the crude oil gathered from a spring near Bonanza Creek. Before a railroad was built into the Black Hills a crude oil was delivered to the gold mines for lubrication purposes from the springs near Moorcroft. This oil brought $28 per barrel.

The first production marketed from the drilled wells was from the Carter well, in Uinta county. The first gusher wells were drilled in the Dallas field in 1885, and the first wells at Shannon on the north end of the Salt Creek field in 1880. Oil from Shannon wells was hauled to Casper by 16-mule team, 18,000 pounds per trip, and sold to the little 50-barrel still refinery, which was built in 1895, at $7 per barrel. Salt Creek field proper was not drilled until 1908.

It is an interesting fact that the first well on Salt Creek Dome was advised and located by an Italian petroleum geologist beside the road that the general public, oil men, prospectors and even geologists had been traveling for more than twenty years. In fact, for some thirteen years oil from the now unimportant Shannon field had been hauled across what is the largest and most productive oil field known to date in the Rocky Mountain district.

Fakes and Frauds.

From the very beginning of oil deevlopment in the State the business has been inflicted with the fraud and faker. Before there was any development certain of the lands had been sold or mortgaged to half a dozen different concerns by the same man at the same time. Hundreds of thousands of dollars were stolen from the English, French and Belgian investors.

Effect of Decision.

Oil is not the only hydrocarbon found in the State. Wyoming could today supply all the natural gas used by Pittsburgh and New York city. But we have no market for it and must await for new uses and new industries to develop before it becomes a wealth producer.

In spite of disadvantages, Federal opposition and the extreme youth of the industry, there should be more than 6,000,000 barrels of Wyoming's high grade paraffine base oil produced during 1917. Future years will see larger yields, not only increasing yields from fields already producing, but from those which have to date made no production, and from the pools which have not yet been drilled. The future of Wyoming's petroleum production looks very bright indeed.

Natural Gas.

The decision of the Appellate judges of the Federal Court during the year is a big thing for the oil development of Wyoming.

Appellate judges of the Federal Court, sitting at St. Paul, decided that Congress meant what it said when it enacted a law to protect oil prospectors and developers. This important decision was rendered in the case of the Ohio Oil Company, heard originally by Judge Riner at Cheyenne last January. The judges sustained the rights of locators under the language of the statute, in spite of the efforts of the Land Office to override the will of Congress. There is nothing doubtful about the following language of the statute, dealing with the powers of the President to make withdrawals of certain lands from entry. The law says that "the rights of any person who, at the date of any order of withdrawal heretofore or hereafter made, is a bona fide occupant or claimant of oil or gas bearing lands, and who, at such date is in diligent prosecution of work leading to discovery of oil or gas, shall not be affected or impaired by such order so long as the occupant or claimant shall continue in diligent prosecution of said work." Diligent prosecution of work leading to discovery of oil or gas is a condition which follows the usual traditions of American mining law in allowing a large measure of discretion to the prosecutor. Efforts of the Russian spies of the Department of the Interior to defeat the most manifest program of oil development under this provision of law is another illustration of the stubborn hypocrisy and despotism of Federal officials in dealing with the rights of the Western people with respect to their own unoccupied lands. The decision of the Court of Appeals is very important, because, since the revolutionary Midwest decision of the Supreme Court in February, 1915 (rendered by a majority of five to three), Western settlers and developers have stood in constant doubt of the courts of last resort. We have begun to wonder whether every Federal Constitution possesses any validity. It is, therefore, a good thing for the courts to inspire faith in the people of the West by rendering decisions concerning the public lands in accordance with the manifest intentions and framers of the Constitution. The recent decision in the Ohio case should greatly encourage prospectors and developers in the new oil fields.

An Important Decision.

The decision of the Circuit Court of Appeals sustaining the ruling made by Judge Riner of the Federal Court of the Wyoming district that discoveries of oil on located land need not necessarily be in commercial quantities, is of importance to several oil companies whose headquarters are in Denver, and especially to the Midwest Refining Company, which, after making discoveries in the Grass Creek district, was attacked by the government on the ground of under discovery, says the Denver Post.

This decision will permit the Midwest Company to regain possession of these lands, where wells showing oil were disregarded by the Federal authorities, and will permit it to develop them as was contemplated. The company, through lease from the locators of these tracts, is entitled to drill upon 1,100 acres of the best land in the Grass Creek section under the decision. The fact is important, as the oil from Grass Creek ranks with the best in Wyoming.

The decision has no bearing upon the lands held by lease by the Grass Creek Oil and Gas Company, which is a subsidiary of the Midwest Refining Company, as all of the property being held under these leases is either patented or on the way to patent. One claim only is contested. In that case the locator had lived on the land nine years, had cultivated the land in question for the same time and has raised eight successive crops of alfalfa from it. The adverse report filed recites that the locator had not acted in good faith because he had been informed just before he had made final proof that the land was valuable for petroleum. This informant brought the contest which the government has entertained.

The Lost Soldier Field.

Recent developments in the Lost Soldier field of Wyoming have created interest in what has been done and is now going on in this rather isolated district. Many erroneous reports have been circulated, and many truthful reports have been suppressed. Stock promotion schemes of many kinds have been put forward, several of which might prove of value. Others will reap the reward usually meted out to careless speculators. To say that oil in paying quantities has been discovered in the Lost Soldier field is absolutely true; to state the caliber of the wells would be something which no one not intimately connected with the principal producing company could state accurately. Suffice it to say, that operations are being pushed vigorously by the Bair Oil Company, Ohio Oil Company, Midwest Refining Company and several other smaller organizations.

The history of the field is about as follows:—In June, 1916, oil was discovered at a depth of less than 500 feet in a well drilled by the Cochran-Funke-Clark syndicate, composed of Joseph Cochran, of Parkersburg, W. Va.; Fred O. Funke, of Moundsville, W. Va., and Noah F. Clark, of Pittsburgh, Pa. In section 11-26-90, in Sweetwater county, estimates of the capacity of this well vary from 50 to 250 barrels, but the news of the strike was suppressed by those interested so that they could go ahead with additional operations before the government learned of the discovery.

No. 2 was started in section 11-26-90, about 800 feet south of No. 1, and July 4 this well came in at a rate estimated at 200 to 300 barrels natural, being drilled 90 feet into the sand. Soon after the completion of No. 2 the rig was moved to a new location in section 10-26-90, about 1,000 feet south of No. 1 and also west. This well reached the top of the sand at 457 feet and had drilled 75 feet into the sand with a good showing of oil, when water from above got down past the casing, and it was decided to case off the soil sand and made a deeper test in hopes of striking another oil bearing stratum. They went through 190 feet of oil sand before casing off. After the hole had been drawn in, another water sand was encountered, and it was necessary to undercream. After several weeks undercreaming had been in progress it was determined to plug the hole above the lower water and make an oil well out of it, which was successfully done. While the well has not been tested yet, the hole stands almost full of oil.

A new location for a deep test has been made by the Bair Oil Company on the southeast quarter of the northeast quarter of section 10-26-90. They will start with a 15½-inch hole, and hope to go deep enough to get the three sands on the frontier series. The same company is 1,200 feet deep at No. 4, section 14-26-90.

Rawlins capitalists have validated a large number of claims on what is supposed to be a heavy oil dome, about eight miles southeast of Rawlings, and have arranged with the Midwest Oil Company for development of part of it.

The Wyoma Oil and Gas Company, composed of Illinois, Pennsylvania and Eastern New York operators, have secured about 4,000 acres and intend starting development work early in the spring.

Great Powder River Field.

Wyoming has come to the front with another promising oil field on Powder River and not very remote from the Salt Creek field, which has produced millions of barrels of the finest crude oil in the United States. In this district, where work is now being prosecuted, all the physical and geological "signs" indicate the presence of oil in vast quantities. Already there have been many discoveries, and while there has been no "boom" as yet, the activities of drillers indicates that a thorough test of the district will be given.

The field is about fifty-five miles from Casper and fifteen miles from the Salt Creek field, in a northwesterly direction.

This field was known as early as in the '80s, though up to date it has not been of any commercial value.

The principal stream of the region is the south fork of the Powder River, which flows northward along the west side of the dome, and, turning to the northeast, cuts across the country until it joins the Powder River in the east. The best drinking water in the vicinity of the dome occurs in the Wall Creek sandstone lentil, which forms the escapment. There are several good springs which flow from this sand in the dome.

The Powder River dome is a somewhat irregular oval structure sixteen miles in length from north to south and ten miles from east to west. About fifteen miles north and a little west of the highest point there is a smaller but similar dome which lies just west of the village of Kaycee. The two domes are connected by a low anticlinical arch and may be considered as parts of a single structure—an anticline thirty miles in length and fifteen in width. The whole structure is a duplication of the anticline at Salt Creek, except that in the Salt Creek anticline, the northern dome is larger. In the Salt Creek dome only rocks of the Montanian group are brought to the surface, where in the Powder River dome older formations are exposed; in other respects the two anticlines are very similar.

The oil of Powder River field is a heavy lubricating oil, somewhat higher in specific gravity than the heaviest oil at Salt Creek. It is black in color and can be used for fuel oil in the crude state or for the manufacture of lubricants. Oil has been found in five different beds in the Powder River field. Prospects of obtaining oil from the Dakota sand are very favorable, though it is the opinion of some experts that the Embar sand will yield the best, and both are within the reach of the drill in the dome. Drilling alone will affirm these opinions.

The presence of oils in two sands, as well as in the Dakota sand, would seem to indicate a common origin for oil. It does not seem unreasonable to suppose that it is working its way upward from some source as yet undiscovered, and that it collects in any sandstone which forms a convenient reservoir. The Embar formation bears oil in the Lander fields, and they appear to be worth testing in the Powder River dome. As in the Salt Creek field, the wells are self-flowing.

On account of the distance, Powder River dome has not felt the mad rush of the oil drillers, investors and speculators, but the oil men of the country are beginning to realize the value of the vast oil field lying dormant, awaiting the touch of the human hand, the brains and capital to make it one of the most productive fields in the country. The oil is there, and as high as fifty barrels of oil can be taken out of any assessment hole any day. The land is being rapidly taken up and released to large outfits, who are making preparation to begin drilling soon.

Tank Cars of Refined Oil.

As proof that the demand for Wyoming oil is increasing steadily, the writer will state that from an authoritative source it is learned within the past week the Midwest Refining Company booked ahead orders totaling 900 cars, and the Greybull refineries were given ahead orders totaling approximately 800 cars.

Shipments averaging 76 cars daily and 1,700 cars booked ahead must impress every reader that the oil industry of Wyoming is established on a firm, sure, stable basis, that the supply of the precious fluid, through modern day methods of development and handling, has proven the oil fields permanent and with a future second to none.

Through the courtesy of the Northwestern Railway, the following table is published, it showing the wonderful increase in shipments over that line alone in less than the short period of four years:—

	Cars.
1912	1,809
1913	3,407
1914	5,900
1915	13,000
1916	12,800

(The latter figure is for the nine months of this year.)

The Burlington Railroad the shipments as reported for a certain period of the year is as follows:—

	Cars.
From Casper, nine months	5,236
From Chattam, nine months	2,762
From Cowley five months	189
From Greybull, five months	1,873
From Frannie, five months	960
Total by Burlington Railroad	11,020
Total by Northwestern Railroad	12,800
Total	23,820

The above figures show a total of but nine months of the year, or from January up to the close of September, and does not include the last three months of the year, which is heavier than the balance of the season. It is estimated that the entire shipments for the year will reach close to 32,500 cars by both railroad lines. The cars hold from 7,000 to 10,000 gallons, but, averaging them at only 8,000 gallons, the shipments will total 260,000,000 gallons of oil and refined products during 1916. The minimum length of the cars is twenty-six feet and the shipments in one load would make a solid train of 160 miles of Wyoming oil and refined products.

The Salt Creek Field.

Back in the desert, forty-five miles north of Casper, is located the famous Salt Creek and Shannon oil field, capable of a production of 25,000 barrels of high grade green crude petroleum. The field, or rather drome, as oil pools are called in Wyoming, covers in round numbers about 6,000 acres. All of the wells flow their product—some of the wells are shut in owing to litigation and some are "pinched" in; that is, only a part of the production of the well is run through the pipeline. The pipelines over the mountains to Casper carry away about 14,000 barrels a day. About 125 wells have been finished on the dome, with every well a producer. Two of the wells have flowed as high as 2,500 barrels a day when first drilled in. The oil is found in what is called the Wall Creek sand, varying from 90 to 125 feet in thickness, a gray formation that is shot with from 60 to 240 quarts of solidified nitro-glycerine. There is a heavy gas flow in some of the wells, and back of that is a heavy salt water pressure. In the center of the dome the wells are about 950 feet in depth. The sand dips from the center of the dome and out toward the edge of the dome the wells are from 1,200 to 1,400 feet in depth. The average depth is about 1,200 feet.

There are not more than half a dozen oil derricks to be seen in the Salt Creek field, and a stranger would wonder where the oil came from. There are no pumping powers or steam engines running—no "barkers" break the stillness of the desert—no gas engine puffing away. Here and there you see a casinghead sticking up out of the sand with a small black oil

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Intermediates

area about it, and lead lines running off to steel flow tanks, two for each well or lease, as the case may be. A wooden tank in the field drops to pieces as soon as it becomes empty, owing to the heat and altitude. Oil gaugers ride on horseback and the two gaugers in the field each run from 6,000 to 7,500 barrels of crude every day in the week. The reason for two flow tanks is so that the well can be turned into the second tank while the gauger is running the first one. Occasionally a well that is shut in breaks through the soft earth and the oil pours out of a hole down the hill-side. The government requires all waste oil to be burned, and a gauger said that often several hundred barrels of waste crude is burned each week. If not burned floods would carry it down the valley and far below damage suits would spring up owing to ruined crops. Crude oil is not a good fertilizer.

All of the oil wells in the Salt Creek field are not on the oil dome proper. About twenty wells have been drilled off the dome and oil found in a black shale at from 1,450 to 2,200 feet. One of these wells was doing 280 barrels a day, and is in what is known as the dip or syncline. There is no gas found off the dome, and the few wells that are producing are pumped.

Contractors get $1.25 per foot for drilling in the Salt Creek field. Gas or oil is used for fuel, and the water is found at a depth of about 200 feet in what is known as the Shannon sand. This is usually cased off with 10-inch drive pipe or casing. One of the expensive parts of development work is the freighting of material from the railroads. It costs $16 a ton to get oil well supplies from the railroad at Casper, forty-five miles away. Twelve to 16-horse teams are used in doing the hauling.

There are twenty-six different outfits operating in the Salt Creek field. The largest holders of proven acreage are the Midwest Oil Company, Franco Petroleum Company, California Oil Company, Crescent Oil Company, Pinero Oil Company, Henshaw Oil Company, Majorth Oil Company and others. It is rumored that at least 50 per cent. of the producing property in the field is in litigation. Originally, part of the land was owned by the government, part by the State and the balance in fee simple by individuals. Oil men who have drilled on the property are still waiting for their patents. Some of the property that was filed on years ago, and a little development work done before being abandoned by the original locator to be later developed by other parties who have invested large amounts of money in drilling is now in dispute. Now that it has become valuable, the man who abandoned it has returned and claims title. In one case there are nine lawyers engaged on each side. This makes it easy to guess where considerable of the production will go. One fine well that is in litigation has produced more than $300,000 worth of oil which has been sold and the money is lying in a bank in escrow awaiting a decision of the courts.

From the lease tanks the oil runs by gravity down to the main pump station on the bank of Salt Creek at the lower or south end of the development. There is a total of 219,500 barrels of storage in the Salt Creek field, a 35,000-barrel tank, a 37,500, a 55,000, with a second 55,000 now completed at the main station, and a 37,500-barrel tank at the North Camp Station at the upper end of the field. There are also two 37,500-barrel tanks and two 55,000-barrel tanks midway between Salt Creek and Casper. The oil must be pumped over the hills 700 feet high to get it from the Salt Creek Station to the refinery at Casper. There is a pump station about half way. In the summertime the Salt Creek Station can pump oil direct to Casper, but in cold weather the half-way pump station is used. All the tankage is practically full, making more than 325,000 barrels of oil in storage in the field and in the half-way tanks. Two 6-inch pipelines that carry the oil out of the field to the refinery at Casper are controlled by the Midwest Refining Company.

The Salt Creek oil up to May 15 sold for 65 cents a barrel. On that date the price was increased to 75 cents. The price now varies from 65 cents to $1 or better a barrel, according to the terms of the contracts.

Government geologists reported oil seepages in Salt Creek Valley as early as 1882, and Jackass Springs was the original oil spring in that section. It is located in section 13. There was considerable prospecting for years, but no market for the oil until the pipeline was put in in 1911, and the refinery erected at Casper to make a market. The gas in the Salt Creek field is rich in gasoline and plans are under way to erect a gasoline plant to utilize it. It is a dusty, rough ride from Casper out to Salt Creek. There are only two small ranch houses on the way. The first ten miles out of Casper is rolling prairie. The rest of the way it grows rougher and rougher. There are many steep pitches and long hills. It costs $20 for the auto trip, whether there is one passenger or three, and it takes three long hours each way. Much of the country is broken, with steep, rocky formations like the walls of old castles with towers and battlements. Clinging to the rocky ledges on the summit are scraggy bull pines. It is picturesque, all right. Back of the oil flow from the wells in the Salt Creek field is a strong water pressure that some day will crowd out all of the oil. One or two wells are already showing water. The Salt Creek oil field will produce about 4,000,000 barrels of oil for 1916. And that is not bad for 6,000 acres of sage brush and sand.

Pilot Butte Dome Field.

Pilot Butte oil dome, the newest and one of the most promising developments in Wyoming, is located in the Big Wind River Valley, thirty-five miles north of Lander, in Fremont county, on the northern edge of the Wind River Indian Reservation. Pilot Butte is named for a butte that rises like a beehive on a range of hills a mile to the left of the valley road. There is just one lone settler at Pilot, Wyo., and he keeps the post office. His neighbors are few and live miles apart, but now the oil excitement has brought in the new men that build the rigs, do the drilling and the tool dressing, the lease men and teamsters.

Plenty of water for drilling purposes comes from the river at a depth of seventeen feet. Coal in abundance for drilling from the mines near by. The first producing sand is found from depths varying from 675 feet to 1,300 feet. The producing sand is gray, eighteen feet thick, and what a driller would call "rich in grease." The largest operators in the field are the Hall Oil Company and the Midwest Refining Company. The Pilot dome was located by Edwin Hall, a former State geologist. The Hall Oil Company drilled in the first well last January or in 1916. The land in the vicinity is part government, part deeded and part Indian land. If the field spreads out as the oil men hope, it will embrace a part of the Wind River Reservation, which would naturally make the Indian as wealthy as in Oklahoma. The government has withdrawn practically all of the land in the vicinity that looks as though it was underlaid with oil.

The nearest railroad point from Pilot Butte is Riverton, thirty-two miles down the Wind River, on the Northwestern Railroad. As fast as the wells are drilled they are shut in, for there is no present market for the output. A telephone line has been completed from the field to Riverton and is in operation. It is announced that the Illinois Pipeline Company stands ready to put in a pipeline when there is production enough in the Pilot Butte field to warrant the investment. Whether or not the pipeline will stop at Riverton or continued on to Shosnoni remains to be seen. Shoshoni has two railroads, the Northwestern and Burlington, and by extending the line to that place it would mean competition in freight rates to the Casper refineries, a distance of something like .60 miles direct east from the Pilot Butte field. The operators are anxious for a pipe line, and with the opening of spring will rush the drill in hopes of getting a line to handle the product of their wells.

The record of the Hall Oil Company in its drilling at Pilot Butte has hardly a parallel in the drilling of new territory in any known field. Out of eleven holes drilled during 1916 in what was wildcat territory the first of the year, eight are big producing wells, two are light producers, and only one a non-producer, although the latter well may make a producer by deeper drilling. The active development of this field was begun in March, 1916, after it became known that the test well drilled a couple of months before had a substantial quantity of oil in it, and ten wells have been drilled in about seven months from that time. In addition to the wells belonging to the Hall Oil Company and associates, the Valentine interests also have a good production in the well drilled in the withdrawn portion of the Pilot Butte field.

These producing wells, while not sufficiently distributed to mark the outline of the field with certainty in any direction, serve to establish the fact that a very considerable acreage is producing territory. It is regarded as absolutely certain that a thousand acres is proved up to date to be within the producing area, which acreage would afford locations for many additional wells, and undoubtedly the present capacity of 1,500 to 2,000 barrels per day could, by additional drilling, be brought up to three times this amount in the lands now known to be certain of production. The Pilot Butte Oil Company, belonging to the Hall Oil Company group, is now placing machinery on its property immediately south of the Wind River, and will proceed with the development of an extensive acreage which is held by this company, lying principally to the south and west of the river, and will push development work during the winter months. As the pipeline has been completed the field will be in a position to put out 3,000 or 4,000 barrels of oil per day.

Present Conditions.

Outside of the well-known producing fields of the State work is going along in many sections where oil has and has not been found in former drillings. Tests are being made in what is known as the La Barge district, north of the town of Fontenelle, in the southern and southeastern part of Lincoln county, in the western part of the State; the Big Buck field, located near the center of Niobrara county, about twenty miles from the towns of Lusk and Nenville; the Upton field, located between Lupton and Thornton, along the Burlington Railroad, in the northern part of Weston county; the Rattlesnake field, along the north flank of the Rattlesnake Mountains, in the southwestern part of Natrona county and along the territory drained by the Wallace Creek, and in the vicinity of the town of Oil City; the Muddy Creek field, located about thirty-five miles southwest of Rawlins, in southwestern Carbon county, west of the Sierre Madre Mountains; in Converse county is no doubt one of the best fields so far discovered in the State and looks as though it might be an extension to the famous Salt Creek field, and if not it may be a rival for first place. This is the Big Muddy field, midway between Casper and Douglas, on the Burlington and the Northwestern Railroads. This field is a new addition to the producing oil areas of Wyoming and looks rich for those that are lucky enough to control inside territory. Formerly the only production of the field was found in the Shannon sand at a depth of less than 1,100 feet, but now that a deep pay has been found in the Wall Creek sand, the source of the big production in the Salt Creek field, the field is having a real oil boom and much property is changing hands at fabulous prices, and drilling will continue along through the winter season. The Big Muddy field will be the 1917 attraction of Wyoming. In the same county is the Brennen Basin field, lying along the north flank of the Douglas anticline, and extending from Cottonwood Creek to Sand Creek, and nearly south of Fetterman, the old army post, and nearly west of Douglas, and the La Bonta field, about seven miles south of Douglas and along La Bonta and Wagon Hound creeks. It is crudely estimated that there are today about 160 strings of tools at work or shut down for better weather conditions throughout Wyoming, and only a part of what will be running by the first of the coming May when the work naturally revives

Natural Gas Conservation.

Wyoming needs a stringent, drastic law providing for the conservation of the State's natural gas. Just as important is the requirement of effectual plugging or concreting of every hole drilled in order to safeguard the oil and gas sands from being flooded by water and their production annihilated. This refers alone to wells that are worthless and being abandoned, as producing wells do no harm. This has and is being done, and is a well-known fact. In the vicinity of Byron enough gas has been wasted in the past three years to light and heat the entire north half of the State for quite a spell, and still the merry exodus goes on. Added to this, in spite of the law forbidding it and a penalty provided, there are not less than a dozen drill holes unplugged or unconcreted that are pouring water into the oil and gas sands.

Mr. Trumbull, the Wyoming State geologist, states that he had made strenuous efforts during the last two sessions of the Legislature to have bills introduced and passed covering these unlawful and unwarranted practices and providing severe penalties for the avoidance of their requirements, but without avail.

Points on Withdrawals.

Register Will Reid, of the Cheyenne Land Office, expresses the opinion that the recent order of the General Land Office withdrawing the Lost Soldier oil field unappropriated lands from entry will not affect any lands on which entry men, prior to the order of withdrawal, had proceeded with due diligence to attempt to make discovery of oil.

CALIFORNIA PETROLEUM INDUSTRY'S BEST YEAR—PRODUCTION 92,000,000 BARRELS.

Number of Wells Completed More Than Double Total in 1915—Five Advances in All Grades During the Year—Many Large Territorial Purchases.

The year 1916 has proven the most industrious and by far the most prosperous year yet recorded in the annals of the California petroleum industry. The year opened with an exceptionally bright outlook, which was not only realized, but excelled, in every branch of the business. The total production for the year approximated 92,000,000 barrels of crude oil, an increase of over 2,000,000 barrels, as compared to the 1915 output. The production increase was not unexpected; in fact, the increased efforts in field operations merited a larger production. By far the most notable item in the yearly summary was the unprecedented mark reached in shipments, the total of which was over 104,000,000 barrels of oil, an increase over 1915 shipments of 12,000,000 barrels. In consequence, the draft on oil stocks of 12,000,000 barrels is a figure unequaled in the history of the California oil industry.

Price Advances Stimulated Production.

Field operations in every department were stimulated by the continued advances in oil prices, until the number of drilling wells at the close of the year numbered over 100 more than the total with which the year had started. The number of wells completed during 1916 more than doubled the 1915 total. Producing wells numbered 6,908 at the close of the year, as compared to 6,142 producing at the first of the year. The monthly average number of new rigs erected during 1916 was just four times the 1915 average.

The last five months in 1915 showed an average monthly underproduction of approximately 700,000 barrels, and although prices paid by the refiners had been advanced several times during this period, no apparent stimulus to field operations was incited. Facing this condition, it was evident that soon there would be a rush of work to reap all the benefits of the advanced prices. In January the San Joaquin Valley was invaded by a storm which razed the oil fields, leaving 1,200 rigs around Taft, Maricopa, McKittrick, Midway and Lost Hills completely demolished. This retarded field operations in those districts for several months.

First of Five Advances.

On February 16 the Standard Oil Company announced the first of five advances in prices of all grades of oil which took place during the year. Field operations, however, throughout the year did not increase proportionately to the advances, and in consequence each month saw a draft on oil stocks, which, on the whole, increased until during December there was a daily average drawing on stocks amounting to 55,796 barrels. The main reason work was not properly stimulated was the increase in prices of all materials used in development work. Prices of commodities absolutely essential in the construction of wells increased as high as from 4 to 500 per cent. Much of the California oil territory is deep, which adds materially to the expense of operation. Also much land in the north, which supposedly had a free title and which controls an enormous production, is yet tied up in litigation with the government, this land having been included in the withdrawal order made in 1909. Thirty or forty actions for the possession of lands developed by operators have been instituted, and more are expected. So a majority of those involved in the litigation are withholding their drills, regardless of market conditions, until a final decision can be reached by the contending factions.

Territorial Expansion.

Most pronounced efforts were made during the year on the part of the large companies to increase their holdings. The future importance of the California oil industry is looming up larger and larger each successive year. The efforts on the part of Secretary Daniels to establish government oil reserves in California and his statements as to the extent of the source of California oil have materialized the future, at any rate to such an extent that properties hitherto regarded as remote possibilities as to their oil-bearing qualities were eagerly sought after and fought for last year by the large oil corporations.

In February papers of incorporation were filed by the Pan-American Petroleum and Transport Company, which within the year took enormous strides in territorial expansion and now looms up as a big factor in the future California oil history. The company is rated as a $15,000,000 corporation, and capital stock to the extent of $15,000,000 was issued. The companies included in the merger were the Mexican Petroleum Company, Petroleum Transport Company, Caloric Company and Buena Fe Company, the combination of which stands as the largest oil merger on record.

The main purchases of property in which the Pan-American Petroleum and Transport Company was involved were the Bell ranch in Santa Maria, consisting of 10,000 acres, with a cash payment of $1,800,000; 400 acres of land at Casmalia for $250,000, and 1,000 acres in Ventura county for $600,000. This company has already started active drilling on most of its properties.

Standard Oil Purchases.

The Standard Oil Company early in the year purchased a large territory controlled by the Monte Cristo Oil Company. In February it also annexed the Lost Hills holdings of the Vulcan Oil Company for a consideration of $250,000. A wildcat well which showed good indications near Long Beach was a signal for a scramble for territory in this locality, resulting in the control for oil development purposes of thousands of acres of land by the Standard. Another addition by the Standard was 800 acres of land near Montebello in November upon which a well was immediately started.

The Dutch-Shell combine early in the year purchased properties in Coalinga for which was paid $4,000,000. Later in March the Hazeltine property in Coalinga was also bought. The total investments of Dutch-Shell now total approximately $20,000,000 in California. In March the company increased its capital stock from $35,000,000 to $45,000,000, the added shares being placed in preferred issues which are being held in reserve, in readiness to be handled under any emergency.

The Union Oil Company added to its territory in Ventura county, but most efforts in expansion were centered in its refining department. Property at Los Angeles Harbor was purchased for the erection of a refinery which will handle all of the company's southern production. The investment represented $2,500,000.

From these indications the oil trade is becoming more centered in the hands of a few of the larger companies, the capacity and resources of which seem almost unlimited. There is no monopoly on any branch of the industry and business will most certainly be transacted on a purely competitive basis.

Prices at Highest Point Yet Reached

California faces an era in 1917 from which continued prosperity in the oil industry is bound to come. Prices are higher than they have ever been. Shipments have reached unprecedented figures and are apparently stable. The keen competition by enormous corporations will tend to keep the industry evenly balanced. The wholeheartedness or good business judgment on the part of the large companies in adopting profit-sharing schemes with their employes will tend toward harmony and efficiency.

Production and Shipments.

Figures prepared and made public by the Independent Oil Producers' Agency at Los Angeles indicate that the actual production of crude petroleum during the year 1916 was 91,976,019 barrels, as compared to 89,725,776 barrels produced in 1915. Shipments for the same period totaled 104,312,905 and 92,007,715 barrels, respectively. Stocks of petroleum were therefore reduced 12,336,886 barrels during 1916.

Production showed a steady increase throughout the year, with the exception of the last two months. The largest monthly production was in August, when 8,079,023 barrels were produced. Production increased about 1,000,000 barrels over the twelvemonth period. This rate of increase was much less than that of shipments, however.

The increase in shipments during the year was 2,705,488 barrels, the last month registering a total never before equaled for one month. The large and steady increase was due to increased exports. The internal consumption remained normal during the year, but export figures increased from month to month until the December total in exports shattered all previous marks.

Figures in monthly underproduction show the difference between production and shipments to be the largest in December.

Following is given a comparison of production and shipments by months during 1915 and 1916, also the shortage:—

Production by Months.

Months.	1916.	1915.
January	6,936,785	7,698,316
February	6,522,548	6,948,929
March	7,525,081	7,567,197
April	7,372,480	7,386,900
May	7,724,184	7,686,517
June	7,643,136	7,443,957
July	8,073,307	7,738,643
August	8,079,023	7,680,047
September	8,020,690	7,330,038
October	8,260,357	7,675,146
November	7,880,447	7,222,608
December	7,936,972	7,397,478
Totals	91,976,019	89,725,776
Production 1915	89,725,776	
Increase	2,250,243	

Shipments by Months.

Months.	1916 Barrels.	1915. Barrels.
January	6,963,161	7,233,766
February	7,191,499	6,157,503
March	8,368,869	7,473,359
April	8,785,715	7,195,044
May	8,829,250	7,760,592
June	8,512,041	7,586,046
July	8,341,119	7,643,949
August	9,548,075	8,077,586
September	9,445,632	7,778,807
October	9,190,114	8,599,681
November	9,468,181	8,294,585
December	9,666,649	8,227,607
Totals	104,312,905	92,007,715
Shipments 1915	92,007,715	
Increase	12,305,190	

Monthly Shortage.

Months.	Production.	Shipments.	Shortage.
January	6,936,785	6,963,161	26,376
February	6,522,548	7,193,499	670,951
March	7,525,081	8,368,869	843,799
April	7,372,480	8,785,715	1,413,235
May	7,724,184	8,829,250	1,105,066
June	7,643,136	8,512,041	869,505
July	8,073,307	8,341,119	267,812
August	8,079,023	9,548,075	1,469,052
September	8,020,690	9,445,632	1,424,933
October	8,260,357	9,190,114	929,757
November	7,881,447	9,468,181	1,586,734
December	7,936,972	9,666,649	1,729,677
Totals	91,976,019	104,312,905	12,336,886

Summary for 1916.

	Production.	Consumption.	Shortage.
Totals, 1916	91,976,019	104,312,905	12,336,886
Monthly ave.	7,664,668	8,692,742	1,028,074
Daily average.	251,989	285,789	33,800

Summary for 1915.

Totals, 1915	89,725,776	92,007,715	2,281,939
Monthly ave.	7,477,148	7,667,309	190,161
Daily average.	245,824	252,076	6,252

Summary for 1914.

Totals, 1914	102,871,907	94,470,989	*8,400,918
Monthly ave.	8,572,659	7,872,582	*700,077
Daily average	281,841	258,825	*23,016

* Surplus.

Daily Average.

The daily average production for 1916 was 251,989 barrels, as compared to 245,824 barrels in 1915, and 281,841 barrels in 1914, the banner year in production. The figures show a steady increase throughout the year, with September showing the largest daily average.

Daily average shipments for the year were 285,789 barrels, as compared to 252,076 in 1915 and 258,825 in 1914. There was a general increase in shipments throughout the year, the largest daily average for one month appearing in November.

The daily average shortage increased from 851 barrels in January to 55,796 barrels in December.

Following are the daily average figures in production, shipments and shortage:—

Production, Shipments, Shortage.

Months.	1916. Production.	1915. Production.	1914. Production.
January	223,767	248,333	279,242
February	224,915	248,176	283,701
March	242,744	244,103	285,141
April	245,749	244,563	285,388
May	249,167	247,952	291,812
June	254,771	248,132	311,191
July	260,429	249,634	285,759
August	260,614	247,743	291,447
September	267,356	244,334	283,461
October	266,463	247,585	269,696
November	262,715	240,753	263,503
December	256,031	238,678	252,451
Totals	251,989	245,824	281,841

Months.	1916. Shipments.	1915. Shipments.	1914. Shipments.
January	224,618	233,347	254,141
February	248,051	219,196	265,092
March	269,963	241,076	283,060
April	292,857	239,835	285,658
May	284,814	250,341	269,452
June	283,755	252,868	299,565
July	269,068	246,550	263,178
August	308,002	260,567	256,067
September	314,854	259,293	241,828
October	296,455	277,409	253,230
November	315,606	276,486	281,455
December	311,827	265,409	203,426
Totals	285,789	252,076	258,825

Months.	1916. Production.	1915. Shipments.	1914. Shortage.
January	223,767	224,618	851
February	224,915	248,051	23,136
March	242,744	269,963	27,219
April	245,749	292,857	47,108
May	249,167	284,814	35,647
June	254,771	283,755	28,984
July	260,429	269,068	8,639
August	260,614	308,002	47,388
September	267,356	314,854	47,498
October	266,463	296,455	29,992
November	262,715	315,606	52,891
December	256,031	311,827	55,796

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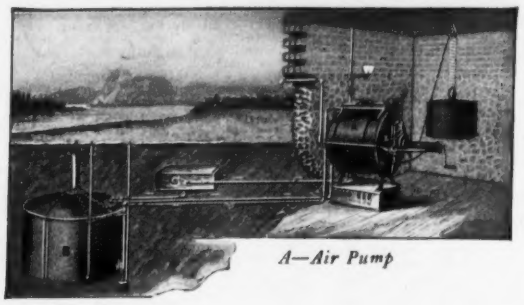

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Production by Fields.

There was an increase in production shown in each section of the State with the exception of the coast section, comprising the Santa Maria-Lompoc and Summerland fields. In the Valley section the increase was a little over 1,000,000 barrels, as was the case in the southern section.

In the Midway-Sunset field, which is the most extensive in the State, a decrease in production was noted of about 450,000 barrels, although the number of producing wells was increased by over 300. This territory has been the scene of most of the large gushers, but during the past year no wells of great capacity were brought in, and as a result the production has decreased.

The Coalinga fields showed an increase in production of nearly 1,000,000 barrels, the production throughout the year showing a steady increase from month to month. In this field much success attended the efforts of some companies in deepening the wells, which is in a large measure responsible for the production increase.

Kern River production increased about 500,000 barrels and was one of the few fields to show an increase over the 1914 mark. The number of producing wells in this field was increased at a high rate.

McKittrick, one of the oldest fields in the State, showed a decrease of approximately 240,000 barrels. This field was developed as early as 1892, since which time it has produced 50,000,000 barrels. McKittrick has yielded more petroleum per acre than any other district in California. The number of producing wells was increased but little in this field during the year.

The Lost Hills-Belridge fields probably have more potential possibilities than any other fields in California. Consequently, much new development work was done in this field during 1916, resulting in an increase in production of over 500,000 barrels. The number of producing wells was largely increased during the year, approximately 100 more being on the list at the close of the year than at the first.

Santa Maria production declined slightly during the year. Very little new work was carried on in this field, with the exception of deepening old holes, from which excellent results were obtained. The sand in this field in some places is 1,000 feet deep, which guarantees the life of the field for years. To increase the production, the hole is deepened.

In comparison to the size of the field more work was done in the Fullerton-Whittier fields than in any other in the State. Production here increased over 1,500,000 barrels, the number of producing wells during the year jumping from 602 to 657. Nearly all the oil produced is immediately moved to the large refining companies in near proximity. Some wildcat drilling is being done in this field with good indications in several holes. The Standard, Union and Amalgamated brought in some excellent wells in this field during 1916.

Ventura fields maintained practically the same figures in production and the number of producing wells during 1916 that was true of 1915.

Little work was done in either the Los Angeles-Salt Lake or Summerland fields beyond keeping up existing production.

Following is given the production of each field, with the number of producing wells:—

Production and Producing Wells in Each Field.

MIDWAY-SUNSET.

Month.	Producing wells.	1916.	1915.
January	1,251	3,040,908	3,463,619
February	1,237	2,879,698	3,115,553
March	1,354	3,313,424	3,352,478
April	1,381	3,221,445	3,249,505
May	1,400	3,348,098	3,345,258
June	1,402	3,186,107	3,234,734
July	1,455	3,378,436	3,301,812
August	1,479	3,383,326	3,334,516
September	1,505	3,419,719	3,221,549
October	1,523	3,537,483	3,472,341
November	1,539	3,266,926	3,243,574
December	1,578	3,197,331	3,279,506
Totals		39,172,871	39,621,003
1914		49,408,493	

COALINGA.

Month.	Producing wells.	1916.	1915.
January	805	958,596	1,209,628
February	712	779,297	1,084,027
March	776	1,009,242	1,228,377
April	821	1,102,872	1,193,140
May	856	1,188,604	1,173,150
June	898	1,283,772	1,138,492
July	906	1,355,214	1,200,950
August	922	1,366,331	1,148,678
September	931	1,320,349	1,033,275
October	944	1,375,064	1,095,356
November	949	1,211,927	1,069,874
December	942	1,343,169	1,054,424
Totals		14,393,437	13,567,380
1914		15,952,190	

KERN RIVER.

Month.	Producing wells.	1916.	1915.
January	1,485	722,016	652,137
February	1,476	683,756	500,904
March	1,527	752,411	555,728
April	1,506	706,206	563,688
May	1,538	713,606	701,609
June	1,544	716,571	755,148
July	1,570	704,992	772,603
August	1,577	715,022	791,445
September	1,599	694,127	725,410
October	1,615	723,286	747,694
November	1,613	693,278	702,442
December	1,618	714,722	715,958
Totals		8,539,973	8,094,673
1914		7,227,422	

McKITTRICK.

Month.	Producing wells.	1916.	1915.
January	263	193,161	387,974
February	264	223,651	294,885
March	266	278,825	314,450
April	266	280,198	293,576
May	266	299,262	312,744
June	268	284,393	309,257
July	271	336,758	317,741
August	273	281,803	376,200
September	273	313,596	295,544
October	273	287,506	285,842
November	276	287,809	263,165
December	278	280,104	266,800
Totals		3,347,166	3,585,899
1914		3,871,352	

LOST HILLS-BELRIDGE.

Month.	Producing wells.	1916.	1915.
January	262	349,244	387,974
February	271	343,824	334,622
March	278	391,477	363,475
April	286	373,975	363,501
May	290	389,218	378,608
June	300	374,918	349,134
July	311	403,164	377,854
August	324	447,355	376,200
September	337	429,906	354,625
October	352	458,436	385,632
November	360	455,393	329,982
December	356	456,591	355,872
Totals		4,873,501	4,310,476
1914		4,825,366	

SANTA MARIA-LOMPOC.

Month.	Producing wells.	1916.	1915.
January	239	336,536	313,649
January	242	336,536	313,649
March	240	365,800	357,361
April	245	352,590	356,594
May	245	354,363	390,228
June	246	362,400	397,569
July	249	385,140	411,986
August	250	379,435	418,110
September	253	354,331	384,685
October	249	371,106	385,682
November	255	385,755	375,000
December	255	380,934	397,226
Totals		4,370,055	4,493,575
1914		4,266,387	

SUMMERLAND.

Month.	Producing wells.	1916.	1915.
January	102	4,500	4,950
February	102	4,500	4,950
March	102	4,500	4,950
April	102	4,500	4,950
May	102	4,500	4,500
June	102	4,500	4,500
July	102	4,500	4,500
August	102	4,500	4,500
September	102	4,500	4,500
October	102	4,500	4,500
November	102	4,500	4,500
December	102	4,500	4,500
Totals		53,500	55,800
1914		59,400	

FULLERTON-WHITTIER.

Month.	Producing wells.	1916.	1915.
January	602	1,088,914	1,191,932
February	604	1,024,466	1,042,768
March	605	1,160,214	1,126,479
April	624	1,106,085	1,048,926
May	625	1,176,953	1,093,035
June	638	1,190,900	1,010,721
July	637	1,263,019	1,076,477
August	637	1,267,470	1,053,375
September	644	1,263,742	1,054,805
October	656	1,285,572	1,071,525
November	659	1,250,975	1,035,065
December	657	1,332,059	1,066,803
Totals		14,409,470	12,874,670
1914		13,800,431	

VENTURA COUNTY AND NEWHALL.

Month.	Producing wells.	1916.	1915.
January	434	92,192	72,343
February	438	86,471	68,628
March	437	90,711	76,730
April	437	89,584	82,710
May	434	93,827	91,109
June	435	94,622	81,730
July	435	94,861	92,926
August	439	89,619	86,885
September	425	85,693	87,203
October	439	88,306	87,753
November	438	88,358	98,409
December	430	92,041	91,258
Totals		1,086,285	1,028,106
1914		943,929	

LOS ANGELES-SALT LAKE.

Month.	Producing wells.	1916.	1915.
January	696	150,718	173,392
February	697	155,130	187,442
March	697	158,467	187,169
April	697	135,116	186,969
May	690	156,681	178,637
June	689	144,953	162,672
July	689	147,223	181,844
August	693	145,162	168,266
September	693	134,766	168,442
October	692	129,538	172,821
November	692	136,466	160,588
December	692	135,521	165,131
Totals		1,729,761	2,094,194
1914		2,456,937	

Total Production by Fields.

Field. Valley—	1916.	1915.	Increase.
Midway-Sunset	39,172,871	39,621,003	*448,132
Coalinga	14,393,437	13,567,380	826,057
Kern River	8,539,973	8,094,673	445,300
McKittrick	3,347,166	3,585,899	*238,733
L. Hills-Belridge	4,873,501	4,310,476	563,025
Coast—			
S. M.-Lompoc..	4,370,055	4,493,575	*123,520
Summerland	53,500	55,800	*2,300
South—			
F'ton-Whittier	14,409,470	12,874,670	1,534,800
L. A.-Salt Lake	1,729,761	2,094,194	*364,433
V. Co.-Newhall.	1,086,285	1,028,106	58,179
Totals	91,976,019	89,725,776	
1915	89,725,776		
Total increase	2,250,243		

*Decrease.

Daily Average.

Field. Valley—	1916.	1915.	1914.
Midway-Sunset	107,323	108,554	135,361
Coalinga	39,434	37,171	43,705
Kern River	23,397	22,177	19,801
McKittrick	9,170	9,824	10,606
Lost Hills-Belridge	13,352	11,810	13,220
Coast—			
Santa Maria-Lompoc.	11,973	12,311	11,688
Summerland	147	153	163
South—			
Fullerton-Whittier	39,478	35,273	37,974
Ventura Co.-Newhall.	2,976	2,817	2,586
Los Angeles-Salt Lake	4,739	5,738	6,731
Totals	251,989	245,824	281,841

Sectional Summaries.

Sectional.	1916.	1915.	1914.
Valley fields..	70,326,948	69,179,431	81,284,823
Coast fields...	4,423,555	4,549,375	4,325,787
Southern fields	17,225,516	15,996,970	17,261,297

New Production.

The initial production from wells completed during 1916 totaled 90,984 barrels, an increase of 10,000 barrels over the previous year's figures. No large wells were completed in any of the fields, so the average production was governed by the number of wells completed.

Following is given the new production:—

Month.	1916.	1915.
January	4,395	6,246
February	8,795	5,190
March	6,790	5,700
April	5,555	4,170
May	3,651	11,300
June	15,835	2,870
July	9,300	6,367
August	7,168	7,870
September	8,810	17,912
October	7,425	4,220
November	5,800	3,375
December	7,400	5,500
Totals	90,984	80,750
1915	80,750	
Increase	10,234	

Field Operations.

During the year 1916 an average of 52 wells were completed monthly, compared to average monthly completions in 1915 of 28, and with 1914 of 37. An average of 238 wells were recorded as drilling on the 1st of each month during 1916, against an average in 1915 of 153 and 1914 of 222. This record establishes the year 1916 as the busiest period in field development in the annals of the California industry. The average number of wells producing on the end of each month during 1916 was 6,542, against 6,016 during 1915 and 5,867 during 1914. Wells were abandoned on an average of 18 monthly during 1916, compared to a monthly average during 1915 of 15 and 11 during 1914.

Every field in the State showed more strings of tools running at the close of the year than had been the case in January. The Midway-Sunset field increased from 50 to 82 strings during the year, Coalinga from 15 to 28 strings, Kern River from 5 to 13 strings, McKittrick from 3 to 20, Lost Hills-Belridge from 13 to 23, Santa Maria from 7 to 31, Fullerton-Whittier from 59 to 90, Ventura County-Newhall from 15 to 26, and Los Angeles-Salt Lake from 0 to 3.

Work in every branch of field operations in every field in the State was increased throughout the year; the close of 1916 witnessed more work being done than ever before.

Following are tabulated the field operations during 1916:—

MIDWAY-SUNSET.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	6	11	6	50
February	19	20	1	40
March	28	13	1	60
April	34	25	13	69
May	27	17	1	77
June	24	28	5	48
July	25	20	3	70
August	24	18	4	69
September	23	20	1	74
October	26	13	1	78
November	25	23	2	74
December	37	21	6	82
Totals	297	229	44	817
1915	88	152	21	534
1914	151	188	27	838

COALINGA.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	..	4	4	15
February	3	1	..	15
March	1	3	..	14
April	2	..	..	17
May	1	1	9	21
June	..	..	1	19
July	1	8	..	23
August	2	..	1	31
September	1	8	13	25
October	9	5	18	27
November	9	3	10	34
December	9	5	2	28
Totals	38	38	58	269
1915	6	12	20	116
1914	13	34	44	255

KERN RIVER.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	2	6	..	5
February	..	3	2	9
March	4	2	..	18
April	8	8	..	18
May	8	13	1	20
June	11	9	5	23
July	6	11	..	21
August	13	9	2	20
September	9	13	..	20
October	..	9	..	23
November	..	12	..	15
December	..	8	2	13
Totals	61	93	12	185
1915	3	13	6	48
1914	7	12	4	51

McKITTRICK.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	1	13	11	3
February	1	3	6	1
March	1	2	1	..
April	4	..	2	6
May	5	2	1	9
June	..	3	..	8
July	1	3	..	7
August	4	..	1	10
September	3	..	1	15
October	4	3	..	14
November	3	2	..	18
December	5	2	..	20
Totals	32	33	23	111
1915	4	2	2	21
1914	11	8	9	29

LOST HILLS-BELRIDGE.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	3	6	1	13
February	6	7	..	20
March	17	7	..	18
April	17	11	2	22
May	15	10	1	24
June	7	9	1	22
July	5	10	..	29
August	7	15	..	17
September	10	14	1	23
October	9	7	..	27
November	13	13	..	23
December	7	9	1	29
Totals	116	118	7	261
1915	19	27	11	66
1914	32	53	12	159

SANTA MARIA-LOMPOC.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	1	1	..	7
February	1	1	..	7
March	2	3	..	4
April	..	1	..	8
May	..	2	1	8
June	2	..	8	11
July	1	1	1	13
August	2	2	..	13
September	7	..	..	15
October	5	..	..	25
November	2	2	2	28
December	6	1	..	31
Totals	29	14	10	170
1915	2	25	39	58
1914	6	12	..	132

FULLERTON-WHITTIER.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	1	6	1	59
February	4	5	1	58
March	9	6	3	56
April	11	6	3	58
May	9	3	8	66
June	6	6	3	64
July	3	4	1	62
August	7	6	..	61
September	6	9	3	58
October	7	5	1	60
November	6	5	..	62
December	2	9	1	60
Totals	71	70	25	724
1915	37	68	23	651
1914	80	77	15	858

VENTURA COUNTY-NEWHALL.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	1	2	1	15
February	3	1	1	20
March	..	..	..	22
April	1	3	..	21
May	3	1	..	22
June	5	1	1	19
July	3	3	1	21
August	3	1	..	26
September	..	..	..	28
October	..	..	5	30
November	4	3	2	27
December	..	2	8	26
Totals	23	17	19	277
1915	10	34	26	216
1914	21	44	11	296

LOS ANGELES-SALT LAKE.

	Rigs Up.	Wells Completed.	Wells Abandoned.	Wells Drilling.
January	..	..	..	..
February	..	..	..	..
March	..	..	..	1
April	..	..	..	1
May	..	..	7	3
June	..	1	9	1
July	..	..	..	1
August	..	..	..	1
September	..	..	..	1
October	1	..	..	2
November	..	..	..	3
December	..	..	..	3
Totals	1	1	16	17
1915	..	1	..	4
1914	3	10	7	40

SUMMARY OF FIELD OPERATIONS.

1916.	Wells Completed.	Wells Drilling.	New Rigs.
January	49	167	15
February	41	176	37
March	35	195	62
April	53	220	77
May	49	250	68
June	57	235	55
July	60	247	45
August	51	248	62
September	64	259	59
October	42	286	61
November	63	284	62
December	57	286	66
Average 1916	52	238	56
1915	28	153	14
1914	37	222	19

1916.	Wells Producing.	Wells Abandoned.
January	6,142	23
February	6,040	11
March	6,282	4
April	6,368	21
May	6,432	29
June	6,522	33
July	6,625	6
August	6,690	8
September	6,762	19
October	6,845	25
November	6,882	14
December	6,906	20
Average 1916	6,542	18
1915	6,016	15
1914	5,867	11

Stocks.

Total stocks of oil at the wells and in the pipelines on January 1, 1917, amounted to 43,640,294, as compared to 55,977,180 barrels on January 1, 1916. More oil stocks were drafted during the twelvemonth period of 1916 than at any other like period in California, the total amount being 12,336,886 barrels, a daily average of 33,800 barrels. The decrease in oil stocks during 1915 was but 2,281,939 barrels, a daily average of 6,252 barrels. During 1915 stocks increased 8,400,918 barrels. The smallest monthly draft on stocks during 1916 was in January, amounting to but 26,376. December recorded the largest monthly draft, totaling 1,729,677, also a record.

Following is shown the range in stocks during 1916:—

Range of Stocks.

1916.	Total barrels.	Total decrease.
January 1	55,977,180	.....
January	55,950,804	26,376
February	55,279,853	670,951
March	54,436,065	843,788
April	53,022,830	1,413,235
May	51,917,764	1,105,066
June	51,048,259	869,505
July	50,780,447	267,812
August	49,311,395	1,469,052
September	47,886,462	1,424,933
October	46,956,705	929,757
November	45,369,971	1,586,734
December	43,640,394	1,729,677
Total, decrease, 1916..	.....	12,336,886
1915..	.....	2,281,939
Increase, 1914..	.....	8,400,918

Market Advances.

The price of oil during the year 1916 was advanced by the Standard Oil Company five times in an effort to increase production. Work was stimulated, but the increased production was not obtained to any great extent. The five advances amounted to an average of approximately 30 cents, including all grades of oil in all the fields of California. The average price per barrel during the year was 53 cents per barrel.

The Independent Oil Producers' Agency advanced the price paid to its members in June from 37 cents plus to 50 cents.

Following is given the prices offered by the Standard Oil Company on January 1, 1916, and on January 1, 1917, also the total production and valuation:—

Standard Oil Prices, Opening, Closing.

San Joaquin Valley Fields.

(Kern River, Midway-Sunset, McKittrich, Lost Hills, Belridge, Coalinga.)

	Jan. 1, 1916. Per bbl.
14 deg. to and including 17.9 deg gravity	$0.43
18 deg. to and including 18.9 deg. gravity	.44
And for each increase in gravity of one full degree above 18.0 deg. gravity, 1 cent per barrel additional.	

Ventura County.

25 deg. to and including 25.9 deg. gravity	.67
And for each increase in gravity of one full degree above 25.0 deg. gravity, 1 cent per barrel additional.	

Whittier-Fullerton Field.

16 deg. to and including 17.9 deg. gravity	.48
18 deg. to and including 18.9 deg. gravity	.49
And for each increase in gravity of one full degree above 18.0 deg. gravity, 1 cent per barrel additional.	

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San Joaquin Valley Fields.

(Kern River, Midway-Sunset, McKittrick, Lost Hills-Belridge, Coalinga.)

	Jan. 1, 1917. Per bbl.
14 deg. to and including 17.9 deg. gravity	$0.73
18 deg. to and including 18.9 deg. gravity	.74
And for each increase in gravity of one full degree above 18.0 deg. gravity, up to and inclusive of 24.9 deg. gravity, 1 cent per barrel additional.	
25 deg. to and including 25.9 deg gravity	.82
And for each increase in gravity of one full degree above 25.0 deg. gravity, up to and inclusive of 36.9 deg. gravity, 2 cents per barrel additional.	
37 deg. to and including 27.9 deg. gravity	1.07
And for each increase in gravity of one full degree above 37.0 deg. gravity, 3 cents per barrel additional.	

Ventura County.

25 deg. to and including 25.9 deg. gravity	.82
And for each increase in gravity of one full degree above 25.0 deg. gravity, up to and inclusive of 36.9 deg. gravity, 2 cents per barrel additional.	
37 deg. to and including 37.9 deg. gravity	1.07
And for each increase in gravity of one full degree above 37.0 deg. gravity, 3 cents per barrel additional.	

Whittier-Fullerton-Santa Maria.

16 deg. to and including 17.9 deg. gravity	.73
19 deg. to and including 18.9 deg. gravity	.74
And for each increase in gravity of one full degree above 18 deg. gravity, up to and inclusive of 24.9 deg. gravity, 1 cent per barrel additional.	
25 deg. to and including 25.9 deg. gravity	.82
And for each increase in gravity of one full degree above 25.0 gravity up to and inclusive of 36.9 deg. gravity, 2 cents per barrel additional.	
37 deg. to and including 37.9 deg. gravity	1.07
And for each increase in gravity of one full degree above 37.0 gravity, 3 cents per barrel additional.	

Production and Value Since 1900.

Year.	Production.	Value.
1900	4,324,484	$4,076,975
1901	8,786,330	4,974,540
1902	13,984,268	4,873,617
1903	24,382,472	7,399,349
1904	29,649,434	8,265,434
1905	33,427,473	8,201,846
1906	33,098,598	9,553,430
1907	39,748,375	14,699,956
1908	44,854,737	23,433,502
1909	55,471,601	30,756,713
1910	73,010,560	35,749,173
1911	81,134,391	38,719,080
1912	87,272,583	39,624,501
1913	97,788,525	45,709,400
1914	102,871,907	46,292,358
1915	89,725,776	41,273,856
1916	91,976,019	48,747,290

Dividends.

Dividends issued by California oil companies aggregated nearly $40,000,000, or more than half as much as the total dividends for the preceding six years. The dividends during the years 1910 and 1915, inclusive, amounted to $69,628,000, according to the report of the State Mining Bureau.

The 1916 dividends include the stock dividends paid by the Standard Oil Company. The Union Oil Company also resumed dividends, which brings up the total. In 1915 the total value of oil dividends paid was $13,100,348 and in 1914 was $15,276,225.

Following is tabulated the dividends paid during 1914 and 1915.—

Dividends, 1914-1915.

	1914		1915	
Field.	Cos.	Value.	Cos.	Value.
Coalinga	15	$1,048,840	13	$283,660
Kern River	20	295,258	20	187,902
Midway	25	917,981	23	853,376
Sunset	5	166,152	7	149,932
McKittrick, Belridge and Lost Hills	8	439,339	7	397,827
Santa Maria, Lompoc and Summerland	6	480,534	6	317,827
Ventura Co.	4	125,832	2	120,143
Los Angeles and Orange Cos.	13	2,453,981	14	863,677
Sub-totals	96	$5,891,917	92	$3,174,304
Miscellaneous and marketing companies	9	9,384,308	13	9,926,044
Totals	105	$15,276,225	105	$13,100,348

Gasoline.

The gasoline trade in California during 1916 assumed an enormous aspect and the price per gallon arose to 20 cents. The consumption in the State alone arose to a previously unequaled figure, due to the large increase in the number of automobiles. On top of this the export trade during the latter part of 1916 in gasoline increased to figures hitherto unequaled, which also drained the gasoline production.

The casing-head gasoline plants are playing a more important role than ever before, owing to this condition of the gasoline market and help in no small way in keeping the production equal to the demand. There are at present 20 plants in operation throughout the State which put out around 38,000 gallons of gasoline per day.

Plants in Each Field.

Following is a list of the plants per field and capacity:—

	Plant.	Gls. daily capacity.
Coalinga	1	1,450
Fullerton	6	9,250
Midway	1	2,000
Santa Maria	8	19,600
Sherman	3	3,575
Ventura	1	2,300
Totals	20	38,175

Oil Springs.

	Barrels	Gallons.
January	4,983	23
February	2,377	33
March	4,909	8
April	3,079	21
May	4,552	24
June	2,786	13
July	2,658	30
August	3,221	27
September	2,903	25
October	2,906	3
November	1,715	17
Totals	35,535	14

Onondaga.

(Including Cainsville.)

	Barrels.	Gallons
January	....	..
February	....	..
March	....	..
April	....	..
May	....	..
June	....	..
July	585	32
August	614	34
September	134	4
October	214	13
November	....	..
Totals	14,166	33

Dutton.

	Barrels.	Gallons.
January	244	20
February	235	5
March	....	..
April	241	30
May	496	4
June	560	22
July	264	4
August	248	6
September	100	1
October	358	24
November	190	28
Totals	2,940	4

Bothwell.

	Barrels.	Gallons.
January	2,826	30
February	2,289	11
March	2,657	26
April	2,174	20
May	2,922	15
June	2,773	6
July	2,833	6
August	2,635	9
September	1,846	24
October	2,946	33
November	2,150	4
Totals	1,549	13

East Tilbury.

	Barrels.	Gallons.
January	1,011	31
February	998	12
March	859	22
April	1,422	22
May	1,098	18
June	1,508	11
July	1,223	8
August	1,886	25
September	621	30
October	872	24
November	2,663	5
Totals	28,056	9

Average Export Prices Mineral Oils, 26 Years.

Annual average export prices per gallon of mineral oils, produced in Canada, and exported from Canada, 1890 to 1915, are available, as follows:—

	Mineral oils, coal and kerosene. Crude.	Refined.
1890	.043	.077
1891	.042	.16
1892	.041	.156
1893	.038	.09
1894	.035	.178
1895	.052	.089
1896	.063	.175
1897	.20	.106
1898	...	.216
1899	.042	.285
1900	...	.244
1901	.046	.203
1902	.081	.216
1903	.05	.145
1904	.046	.214
1905	.05	.213
1906	...	.216
1907	.153	.242
1908	.002	.144
1909	...	.22
1910	...	.127
1911	...	.161
1912	...	.081
1913	.214	.165
1914	.104	.143
1915	.069	.187

went either to Vera Cruz for fuel or to Puerto Mexico, being shipped by "El Aguila" to its refinery at that place.

Production.

Production for the year is placed at 37,500,000 barrels, which is an increase of practically 4,000,000 barrels over 1915, and is the largest production the country ever knew. At the same time, however, this production is not the potential production of Mexican wells, which is given at practically 650,000 a day. Lack of ocean transportation is the major reason more of this large potential production is not moved to the world's markets, the dearth in ocean shipping being well known.

Last year's production by fields was virtually as follows:—

	Barrels.
Southern fields	28,268,518
Panuco	6,971,594
Topila	703,335
Ebano and miscellaneous	1,276,576
Isthmus	190,000
Total, 1916	37,410,023
Total, 1915	33,927,950
Increase	3,482,073

Storage.

Storage at the end of the year is figured at 21,000,000 barrels, a 2,000,000-barrel advance during the year, of which steel storage is estimated at 13,000,000 barrels, with the rest of the oil stored in earthen reservoirs. This storage increase, taken in connection with domestic sales, a million and one-half barrels of which were tank car deliveries, takes care of the surplus production, or production not accounted for in shipping reports.

Wells Completed.

Wells completed during the year numbe thirty-three, with an initial production of 128,000 barrels. There were seventeen unproductive wells in this total which have been abandoned, twenty wells being productive. Made into a table, the fields report for the season is:—

Field.	Completed.	Production.	Abandoned.
Southern	4	110,000	2
Panuco	15	16,670	7
Topila	9	1,130	5
Others	5	210	3
Totals	33	128,000	17
1915	21	81,400	6

The Southern table shows two wells that produced oil having a production of 110,000. One of these wells was the Huasteca Oil Company's (a Doheny interest), and while its production is really figured in many quarters as being much larger than the one given (100,000), it is conservatively figured in many quarters that for purposes of statistics this figure is a proper one to apply. This was the much-heralded Cerro Azul 4. The other figures are, generally speaking, not very interesting to the oil fraternity here, as the wells finished were confined in the main to proven fields and were not large enough, Mexico considered, to create comment.

SMALLER CANADIAN CRUDE PETROLEUM PRODUCTION IN 1916—PRICES HIGHER

Toronto, Can., Jan. 7, 1917.

The trend towards smaller production of crude petroleum has continued in Canada during 1916. No new fields were discovered.

Southwestern Ontario continues to be the chief producing centre in Canada. The Calgary, Okotoka, or Southern Alberta oil field continues negligible. Neither have the gas producing areas broadened out to any extent, Southern Ontario still producing the larger share and continuing to be the greatest consumer.

The future still holds, in the opinion of oil men, a great development in the consumption of gasoline in motor vehicles and this holds good of the immediate future.

The search for oil in commercial quantities in Alberta continues, despite the explosion of the Calgary oil "boom" of two years ago. Some important work was initiated during the year and much is anticipated for the future.

Development of Athabasca Field.

As soon as the steel on the Alberta and Great Waterways Railway is laid to McMurray a carload of machinery and piping will be taken north for the new Athabasca oil-drilling enterprise now getting under way.

The Spokane-Athabasca Oil Company, a concern operated under a provincial charter, will operate the new Athabasca oil fields. The company has an authorized capital of $1,000,000 and a tract of 5,700 acres on the east bank of the Athabasca River, 40 miles below McMurray. Beds of asphalt extend along the shore and under the water, and the banks of the river are in some places solid masses of tar sand, with seepages of oil strongly in evidence. The banks at this point run from 15 to 30 feet high, and the deposits of petroleum-soaked sand are believed to extend well back from the river front. At first the boring operations will be conducted as close as possible to the river, in order to facilitate shipping.

During the year the lamp kerosene has been as cheap with crude oil at $1.15—as it was for months—as it was in the days when a barrel of crude oil could be bought at the wells for 40 cents. The price of mid-continent crude determines the cost of Canadian oil.

February 15, 1915, for example, the price of mid-continent crude at the wells was 40 cents. But this autumn it was $1.15. On March 14 of the year just closing, 1916, the mid-continent price or Canadian price, was $1.55, and it stayed at that figure until July 24, 1916. During this period the price in Canada of kerosene remained at 23 cents to the householder and 15 cents at the tank.

Changes in the price of crude over a longer period will illustrate further the present conditions in the oil trade. In 1911 in Canada a barrel of crude was worth 50 cents, and by November 27, 1912, the price reached 75 cents. In the following year the high water was $1.05, reached on November 22, and it held at that figure until February, 1914.

During June, 1916, the average price paid by the householders in all Canadian cities was 23 cents, and in the same month of 1915 it was 23½ cents, practically the same average as in each year since and including 1910.

From February, 1914, prices of crude had gone steadily down until during the summer of that year it touched 53 and afterwards weakened until the low point of 40 cents was reached in February, 1915.

Gasoline prices today are high and the demand continues strong; so much so that materially lower prices are not expected. At the present time the demand for gasoline is out of proportion to the demand for other products from the crude.

Gasoline Consumption in 1916.

The estimated consumption of gasoline in Canada for the year 1916 was 1,500,000 barrels, which represents a very material increase over the amount consumed in 1915 and was due entirely to the larger demands of the eastern provinces. The consumption of gasoline in the West—in Manitoba, Saskatchewan, Alberta and British Columbia—showed a marked falling off compared with the previous year. This is accounted for by the high prices of gasoline, which has been substituted by kerosene by the farmers who operate tractor engines. The Western farmer uses gasoline when it is cheap, and when that variety of product is expensive he uses kerosene. The majority of tractors are built with a view to using kerosene.

While the consumption of gasoline in the West was reduced, Ontario, Quebec, New Brunswick and Nova Scotia have increased the volume consumed, and this gasoline in the Eastern provinces was used practically altogether in motor cars and motor trucks.

Wholesale prices of gasoline tank wagon deliveries in the city of Toronto December, 1915, was 24 cents per Imperial gallon; December, 1916, 27½ cents per Imperial gallon.

Crude Production in Canada 1916

The estimated production of crude oil in Canada is given in the tables which follow. The figures are for the year 1916, exclusive of the month of December, and are divided into districts. The barrels are of 35 imperial gallons. The total, which illustrates the declining production, is 177,603 barrels and 24 gallons for the eleven months.

Petrolea.

(Including all districts not enumerated.)

	Barrels.	Gallons.
January	6,285	25
February	7,578	34
March	6,176	11
April	7,276	25
May	9,023	31
June	11,263	23
July	9,990	27
August	10,800	30
September	9,358	4
October	9,188	9
November	8,394	10
Totals	95,335	21

Mexican Oil Production Shows Increase of 5,500,000 Bbls.

Tampico, Mexico, Jan. 9, 1917.

The total shipments of oil from Mexico—that is, Tampico and Tuxpam—during the year 1916 aggregated, in round figures, 30,100,000 barrels, which is an increase of 5,700,000 barrels over 1915. Of these figures, 17,747,000 barrels represent shipments from this place, while the remainder went forward from Tuxpam. There is some little oil secured on the Isthmus of Tehuantepec, but this is utilized in that place by the Pearson company, "El Aguila," which has a refinery there, so it does not disturb the shipments given to any extent, being used up in the manufacture of refined products which find a local sale.

Of the shipments noted, 23,000,000 barrels went to the United States, South America took 2,600,000 barrels, and, with the exception of a few cargoes, the remainder

Comparative Prices, Pennsylvania Crude Oil, from 1860 to 1917.

Year.	High.	Low.
1860	$20.00	$2.00
1861	1.75	.10
1862	2.00	.10
1863	4.00	2.00
1864	14.00	3.75
1865	10.00	4.00
1866	5.00	1.65
1867	4.00	1.50
1868	5.50	1.80
1869	7.00	4.25
1870	4.90	2.75
1871	6.15	3.40
1872	4.10	3.00
1873	3.05	1.90
1874	1.90	.45
1875	1.65	.90
1876	4.23½	1.48¾
1877	3.70	1.53¾
1878	1.87½	.78¾
1879	1.28¾	.63¼
1880	1.24¾	.71¼
1881	1.01¾	.72½
1882	1.35	.49¼
1883	1.24¾	.83¼
1884	1.15¾	.51¼
1885	1.12¾	.68
1886	.92¼	.60
1887	.90	.54
1888	1.00	.71¾
1889	1.12½	.70½
1890	1.07¾	.60¾
1891	.81¾	.50
1892	.64¼	.50
1893	.80	.52¾
1894	.95¾	.78½
1895	2.00	.94½
1896	1.50	.90
1897	.96	.65
1898	1.19	.65
1899	1.66	1.15
1900	1.68	1.05
1901	1.30	1.05
1902	1.54	1.15
1903	1.90	1.50
1904	1.85	1.50
1905	1.61	1.27
1906	1.64	1.58
1907	1.78	1.58
1908	1.78	1.78
1909	1.78	1.43
1910	1.43	1.30
1911	1.35	1.30
1912	2.00	1.35
1913	2.50	2.00
1914	2.50	1.45
1915	2.25	1.55
1916	2.75	2.25

Crude Oil Production by Months, Districts, Bounty Paid for Year 1916.

	District of—							
Month.	Lambton.	Bothwell.	Dutton.	Tilbury.	Onondaga.	Total gallons.	Barrels.	Bounty paid.
January	311,575	97,617	3,804	33,296	....	446,292	12,751.07	$6,694.38
February	360,875	91,274	8,230	18,440	2,084	480,903	13,740.03	7,213.52
March	377,387	93,513	....	117,934	....	588,834	16,823.29	8,832.46
April	372,244	79,652	3,030	49,937	....	505,463	14,441.28	7,581.95
May	490,414	109,934	7,661	21,729	....	629,735	17,992.15	9,445.95
June	510,093	112,374	14,904	85,959	....	723,330	20,675.05	10,854.45
July	393,679	90,235	9,244	36,510	5,499	535,167	15,290.17	8,027.46
August	501,404	108,476	8,686	63,622	26,339	710,528	20,300.28	10,657.93
September	390,499	88,027	3,501	38,489	1,024	521,531	14,900.31	7,822.93
October	422,168	88,232	12,554	8,730	17,198	548,882	15,682.12	8,233.24
November	373,561	109,152	7,909	51,762	....	552,444	15,784.04	8,286.65
December	....	....	....	....	....	....	....	....
Totals	4,504,499	1,068,486	79,883	538,397	52,144	6,243,409	178,383.04	$93,650.92

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Production of Petroleum in Baku Region, Jan.-Nov. 1916.

According to the Council of the Congress of the Baku Petroleum Industrialists, the production of petroleum in the Baku region made 33,300,000 poods in the month of November. The total production of petroleum between January and November inclusive in this district is as follows:—

The four chief producing districts of Baku produced in the eleven months 305,600,000 poods of petroleum, against 315,000,000 poods in the corresponding eleven months of 1915. On the other hand, in Surachany the production of petroleum grew considerably, and made for the period named 85,700,000 poods, against 53,800,000 poods in 1915.

The total production in the five principal Baku petroleum producing areas for the eleven months amounted to 391,300,000 poods, against 368,800,000 poods in 1915, that is to say an increase of 22,500,000 poods.

The quantity of petroleum produced at Baku in the month of November (o.s.) was 33,316,000 poods, of which 2,632,000 poods came from flowing wells.

NEW YORK DRUG MARKET WAS GENERALLY PROSPEROUS—SUPPLIES OFTEN LIMITED

New Records Established for Botanicals and the Coal-Tar Chemicals and Drugs—Commodities of Foreign Origin Affected Greatly by War Conditions.

In spite of the many unusual conditions which prevailed throughout the year as a result of the continuance of the war the New York drug market witnessed a period of general prosperity. Purchasing operations by domestic consumers were conducted along conservative lines, especially as so many important articles in the list were in scanty supply and very high in price. The heavy demands from foreign sources, chiefly the belligerents, more than offset this backwardness of American consumers, and, taken as a whole, the year was one of great activity.

Exports of narcotics, anæsthetics, pharmaceuticals and the various basic materials used so extensively in the manufacture of war materials, were the largest ever recorded in a single year. Foreign trade in crude drugs with neutrals assumed larger proportions, and efforts were directed to hold this commerce, even after the termination of hostilities in Europe.

New Records for Botanicals.

Shipping operations, a shortage in labor, the embargoes and restrictions governing the importation and sale of numerous commodities had a marked influence upon the trade. New high record prices obtained during the year for the botanicals formerly grown in the war-stricken sections of Europe. These high prices stimulated the production of botanical drugs in this country, but the industry was hampered by labor conditions, and the quantities which actually came on the market, with but few exceptions, failed to right conditions. Russian crude drugs were in meager supply as a result of the inadequate shipping facilities. Little or no relief was offered in replacing the diminishing stocks of German, Austrian, Turkish, Bulgarian and Serbian crude drugs and prices for the commodities affected reached the highest point in years.

Coal-Tar Chemicals and Drugs.

The rapid development of the coal-tar industry was the sensation of the year. Toward the close of 1916 this industry attained record proportions, and the progress made in producing some of the finer chemicals and drugs was of such a character as to greatly relieve the shortage which has existed since the outbreak of the war, and a general weakening of prices for practically all coal-tar derivatives was in evidence. Early in 1914 there were six American factories in operation, producing in the aggregate about 3,300 short tons of coal-tar products annually. Toward the close of 1916 this industry claimed some thirty plants, with a total production of approximately 28,000 tons annually. This enormous increase could be traced directly to the war, which brought home the fact that an absolutely independent source of supply of coal-tar products was indispensable for the welfare of the nation. The unprecedented growth of this industry led to the enactment of provisions in the Federal revenue law for a protective tariff relating to the importation of coal-tar bases, intermediates and finished products. With the exception of the limited quantities of coal-tar products brought to this country by the submarine Deutschland on its two voyages, the several shipments of colors for use by the Bureau of Printing and Engraving and the importations from Switzerland, American consumers were absolutely dependent upon domestic manufacturers for requirements.

Aside from taking care of domestic needs the American producers of coal-tar products were able to ship enormous quantities abroad. These exports, however, were restricted chiefly to the coal-tar bases and the intermediates used extensively in the manufacture of explosives, etc.

Commodities of British Origin.

More stringent trade regulations affecting commodities of British origin were put into operation during 1916, hampering business here, and in many instances leading to smaller available supplies and enhanced values. The heavy toll of ocean tonnage, through the activities of the German submarines, was largely responsible for these measures. Speculation in drugs and kindred articles throughout the British Empire was discouraged, but this failed to have the desired stabilizing effect upon prices. The course then adopted was to accumulate sufficiently large stocks of the various crude materials in Great Britain, to guard against any possible shortage on account of the freight situation, and only after the British requirements were fulfilled were exportations, under special license, possible.

The Mexican political situation was a diturbing factor, causing uneasiness among the importers of Mexican crude drugs and resulting in sharp market fluctuations.

The operation of the Harrison law fully bore out the conclusion reached in 1915; namely, that the consumption of narcotics in the United States has been curtailed by approximately 75 per cent. This, however, was offset, to some extent, by the increased demand for opium derivatives from the belligerents.

Late in December the possibilities of an early cessation of hostilities were brought to the attention of the drug trade through the official publication of the note expressing the willingness of Germany and her allies to consider peace proposals. As business at this period was rather inactive, and inasmuch as the Entente did not pass upon the proposition favorably, the influence of the peace proposals as a market factor was negligible, and few price changes could be traced to this cause.

Opium and Its Derivatives.

Stocks of opium were greatly reduced by the cutting off of sources of supply, and prices over the whole of 1916, but especially toward the close of the year, were the highest on record. The strong position of opium naturally affected the opium derivatives, prices for which being abnormally high. The demand for quinine salts was fairly active, and with shipments of bark from Java curtailed, the average price for the year was considerably higher than in 1915. Cocaine met with a heavy export demand, and as basic materials were strong on smaller offerings, and on the increased cost of transportation, the market ruled high throughout the period.

The Glycerine Market.

Keen interest was shown in the market for glycerine. The production in this country was probably the largest on record, due to the abnormally heavy war demands for the dynamite grade. Prices for glycerine, however, were slightly lower than toward the close of the preceding year. Trading in glycerine for medicinal purposes was about normal in volume. Imports of glycerine into the United States in 1916 showed a falling off of more than 100 per cent. compared with 1915.

The remarkable progress made by the manufacturers of coal-tar bases, and the so-called intermediates, necessary in the production of finished dyes, synthetic aromatics and medicines, afforded much needed relief to consumers. Benzol, toluol, carbolic acid, picric acid, benzoic acid, the salicylates, benzoates, antipyretics, naphthaline, resorcin, and numerous other items coming under the category of coal-tar products, were available toward the close of the year at substantial reductions, especially for forward delivery.

Codliver Oil Market.

Due to the heavy buying of Norwegian codliver oil by German and British interests, the market for this commodity was forced upward sharply, establishing new high records for all brands. The high prices which obtained for Norwegian oil furnished the incentive for increasing the production of Newfoundland medicinal oil and exports from the latter country showed a substantial increase and contributed to a considerable extent toward checking the upward movement of prices for the European product. Castor oil ruled high as a result of the high cost of seed, and the difficulties encountered in securing adequate freight accommodations on shipments from India.

Camphor and the Gums.

Importations of both crude and refined camphor were the largest on record, but, due to the rapid expansion of the celluloid industry, the tendency of prices for the gum was upward throughout the year, closing at the highest point. Gum tragacanth was in light supply through the cessation of shipments from Turkey. Gum arabic also moved upward as a result of light holdings and meager shipments from primary markets.

Exportations of alcohol during 1916 were the largest ever recorded, and prices advanced sharply, especially for the wood and denatured. There was heavy buying of denatured alcohol by explosive makers, as well as for the ordinary sources of consumption. Color manufacturers were liberal purchasers of the refined wood grade for producing the methyl colors. Prices closed firm and at or near the high point for the year. The high cost of raw materials was a factor in the market, especially for grain alcohol.

Metal Derivatives Abnormally High.

Virtually all of the metal derivatives were abnormally high, in sympathy with the strength in the basic materials. Early in the year the market for quicksilver touched the highest price on record, but as supplies were increased through larger production, the market eased off later, closing around the low level for the year. The mercurials were naturally affected by the sharp fluctuations in the market for quicksilver. Metallic bismuth was scarce, and prices for the bismuth salts were, at intervals, wholly nominal and extremely high. Antimony salts also were firm, although freer offerings were noted toward the close of the year. Nitrate of silver was steady, reflecting the firm position of the white metal.

A good business was done in strychnine, and, in sympathy with nux vomica, prices ruled firm in all quarters. Saccharine was advanced sharply, touching the high point for the year during the last quarter. In December the offerings from domestic manufacturers were freer and slight weakness set in. Price changes in the market for menthol were confined within narrow limits. The undertone was steady, however, due to the increase in the cost of import.

New York State Narcotic Investigation.

The outstanding feature in regard to State legislation affecting the drug trade was the passing of a resolution, introduced by Senator Whitney, chairman of the Senate Committee on Public Health, calling for the appointment of a commission, consisting of two Senators and three Assemblymen, vested with the power to examine into existing laws for the regulation of the traffic in narcotics and prepare measures for enactment in this State should such new legislation be deemed necessary. Proposed amendments to the Boylan-Bloch law were defeated, being replaced by the appointment of the Narcotic Commission. The commission held many hearings in the larger cities of the State for the purpose of obtaining first hand information which would tend towards furthering the movement of correcting the existing drug evil. As the commission was still in session at the close of the year, the work done during 1916 had to be carried over until the next session of the Legislature.

Opium and Derivatives.

Owing to the great shortage in supplies, as a result of the European war, the market for gum opium was largely nominal throughout the year. Prices closed at the highest point since 1870, actual business passing around $13.50 per pound for the gum, in cases. Imports into the United States during 1916 showed a decrease of fully 75 per cent., compared with the two preceding years. With virtually nothing available from Turkey or Macedonia and as supplies of Persian gum were scanty, on account of the shipping situation and the partial embargoes, importers and manufacturers here were forced to advance prices sharply in order to conserve their limited holdings.

The contraction in domestic consumption of opium and derivatives through the enforcement of the Harrison law was offset by the extensive buying of foreign consumers to supply the demands created by the war. This foreign demand was not so much in evidence during the second half of the year, as the British manufacturers were in a position to undersell the American manufacturers by the use of East India gum, which contains less than 9 per cent. minimum of morphia content required for admission into the United States. For a time this cessation of export buying developed an easier tendency in the local market.

Persian gum opium was imported into the United States for the first time in the history of the trade. The Persian article, which ordinarily averages less than the 9 per cent. of morphia content, was so treated that the average was brought up to the government requirements. The moisture content also was reduced by approximately 10 per cent. Since the morphine content has been increased and the moisture content reduced, the gum imported was classified by the customs authorities as a drug improved in condition and value and therefore dutiable at the rate of $4 a pound. The existing tariff on crude gum is $3 a pound.

The year opened with gum opium, in cases, quoted at $11 per pound. The market advanced steadily, touching $11.50 in February. Prices held until June, when, in view of the foreign competion in derivatives the market eased off, gum opium selling down to $10.75 in September. In the fall, however, as shipments from abroad virtually ceased, prices again strengthened in all quarters. A partial embargo on shipments from the United Kingdom added to the distressed condition of American importers. The year closed with gum opium at $13.50 per pound, the highest point for the year.

Opium Derivatives.

In sympathy with the basic material prices for the opium derivatives were abnormally high throughout the year. While domestic business was curtailed, due to the enforcement of the Harrison law, export trade improved materially, due to the demands for narcotics for use in the war hospitals. Prices for morphine sulphate, in 5-ounce cans, ranged from $5.50 to $7 per ounce, bulk basis. Codeine was quoted during the year from $6.35 to $8.25 per ounce, bulk basis. Throughout the year manufacturers refused to take on forward contracts, owing to the very unsettled condition of the market for the crude gum.

OPIUM PRICE RECORD.

The following table shows the high and low prices for the gum in each of the twelve months of last year:—

GUM.

	Per pound— High.	Low.
January	$11.30	$11.00
February	11.60	11.00
March	11.60	11.50
April	11.60	11.50
May	11.60	11.50
June	12.90	11.40
July	11.40	11.00
August	10.90	10.90
September	11.00	10.75
October	11.50	10.50
November	12.00	12.00
December	13.50	12.50
Year	13.50	10.50

POWDERED.

	Per pound— High.	Low.
January	$12.50	$12.25
February	13.10	12.50
March	13.10	13.00
April	13.10	13.00
May	13.10	13.00
June	13.10	12.90
July	12.50	12.15
August	12.10	12.05
September	11.90	11.70
October	12.50	11.50
November	13.00	13.00
December	14.50	13.50
Year	14.50	11.50

GRANULAR.

	Per pound— High.	Low.
January	$12.60	$12.50
February	13.10	12.50
March	13.10	13.00
April	13.10	13.00
May	13.10	13.00
June	13.10	12.90
July	12.50	12.15
August	12.10	12.05
September	12.05	11.85
October	12.50	11.50
November	13.00	13.00
December	14.50	13.50
Year	14.50	11.50

High and Low Prices Since 1870.

We append the following table showing the crops and the high and low prices for cases on spot since 1870:—

Year.	Crop, cases.	Prices— High.	Low.
1916	*	$13.50	$10.75
1915	7,500	11.00	6.90
1914	7,500	10.00	6.00
1913	8,500	6.00	5.60
1912	6,500	8.50	6.00
1911	10,500	8.50	4.70
1910	4,800	6.00	4.80
1909	4,800	6.00	4.00
1908	4,650	5.75	4.05
1907	3,000	7.00	3.45
1906	7,500	3.50	2.72½
1905	3,700	3.30	2.72½
1904	11,200	2.95	2.62½
1903	3,200	3.50	2.70
1902	10,000	3.05	2.70
1901	5,600	3.45	3.00
1900	8,200	3.45	3.00
1899	6,400	3.37½	2.80
1898	3,000	3.75	2.70
1897	7,000	2.85	1.95
1896	3,600	2.40	1.90
1895	7,500	2.30	1.60
1894	4,500	3.25	1.85
1893	2,345	3.15	1.77½
1892	7,500	1.90	1.50
1891	7,400	2.25	1.75
1890	5,300	3.85	2.00
1889	5,500	3.40	2.82½
1888	8,700	3.87½	2.05
1887	7,800	4.60	3.25
1886	7,500	3.25	2.80
1885	7,000	3.90	3.30
1884	6,000	4.10	3.50
1883	6,500	4.12½	3.50
1882	5,500	4.50	3.87½
1881	10,000	6.25	3.90
1880	2,000	7.75	4.87½
1879	4,000	5.25	4.35
1878	5,500	4.70	4.25
1877	9,500	6.70	4.75
1876	3,280	6.60	4.75
1875	6,489	7.75	5.00
1874	2,300	9.00	5.00
1873	3,200	7.90	5.95
1872	4,500	7.90	6.10
1871	7,961	6.00	4.90
1870	4,273	9.40	5.25

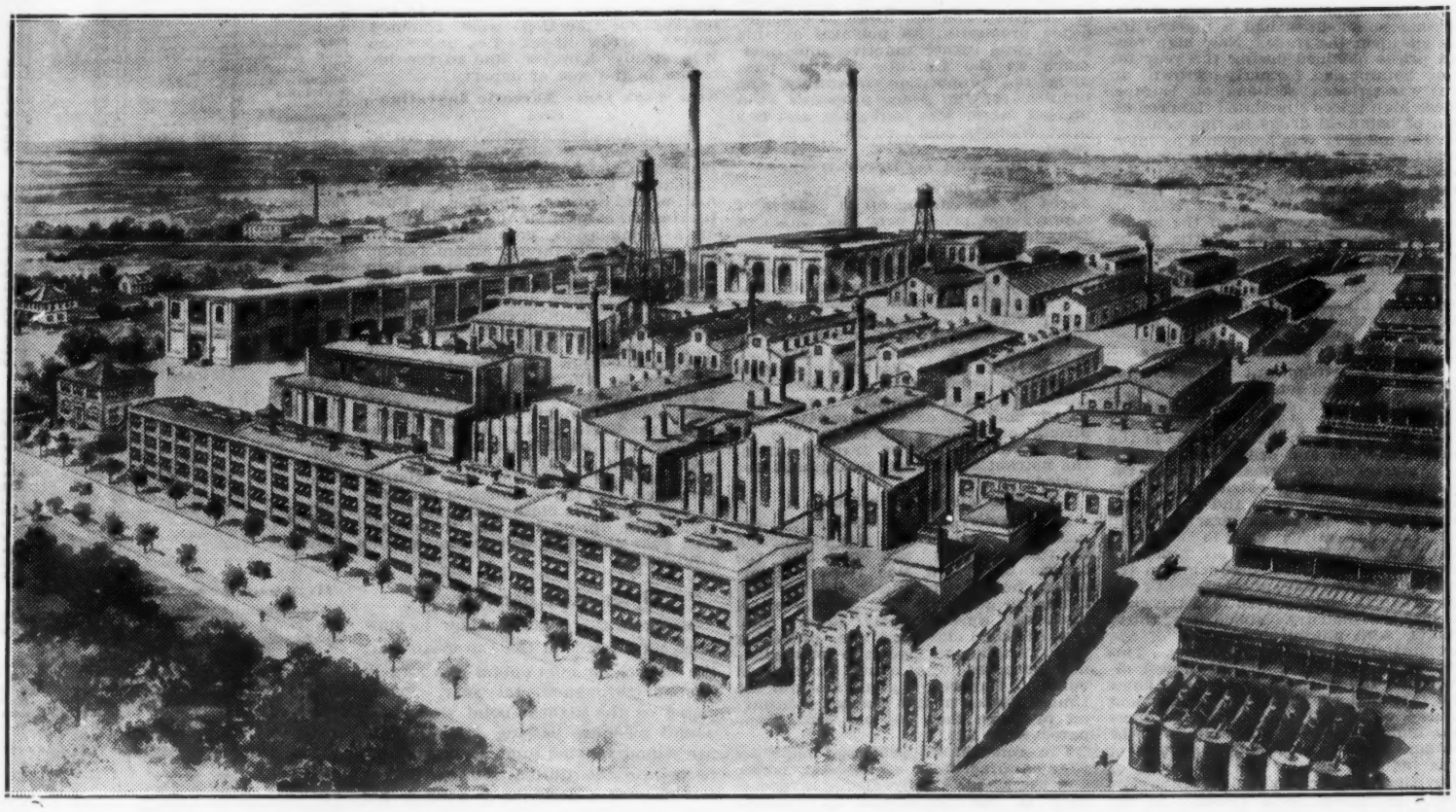
* Due to the conditions brought about by the European war no satistics or even estimates on the 1916 crop of gum opium were available.

AMMACO

TRADE MARK

AMERICAN MADE COLORS

Acid Colors
Basic Colors
Mordant Colors
Sulphur Colors
Direct Colors



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BRANCHES

BOSTON PHILADELPHIA CHICAGO CHARLOTTE TORONTO

MORPHINE.

The following summary shows the high and low prices of this opium derivative for each month during 1916:—

	Per ounce	
	High.	Low.
January	$5.50	$5.50
February	5.50	5.50
March	5.50	5.50
April	5.50	5.50
May	5.50	5.50
June	5.50	5.50
July	5.50	5.50
August	5.50	5.50
September	5.50	5.50
October	6.50	5.50
November	6.50	6.50
December	7.00	7.00
Year	7.00	5.50

CODEINE.

The following table of price fluctuations shows the course of quotations for this opiate each month of last year:—

	Per ounce	
	High.	Low.
January	$6.55	$6.55
February	6.35	6.35
March	6.35	6.35
April	6.35	6.35
May	6.35	6.35
June	6.35	6.35
July	6.35	6.35
August	6.35	6.35
September	6.35	6.35
October	7.75	6.35
November	7.75	7.75
December	8.25	7.90
Year	8.25	6.35

Quinine.

Shipments of cinchona bark from Java to the United States were no larger than in 1915, by virtue of the agreement of the Java growers' organization, and with importations of the salts short of requirements owing to the war, prices during 1916 were the highest on record. The demand from domestic and foreign sources was fairly active, despite the abnormally high prices which prevailed. Record prices were realized at each of the auctions of druggists' quality bark held in Amsterdam. The freight situation seriously affected business in both the bark and the salts. Importations of salts into the United States were larger than in 1915, but the figures compare unfavorably with those of the preceding years.

Prices for quinine sulphate in the New York market for the year ranged from 50c. to 75c. per ounce, bulk basis, which compares with 26c. to 75c. per ounce in 1915, 26c. to 31c. per ounce in 1914 and 19½c. to 26c. per ounce in 1913. The year 1916 opened with American salts manufacturers asking 75c. per ounce, in 100-ounce tins. This price was firmly maintained until August. During this period second hands obtained from 60c. to $1.10 per ounce for their offerings. In September manufacturers lowered their inside basis for the sulphate to 65c. per ounce, due to competition, and this was followed by a general reduction to 50c. in October. Business was inactive throughout the fall months, and, with competition between manufacturers and "outside" interests keen, the undertone was barely steady. Second hands offered the salts down to 47c. per ounce in November. Conditions improved in December, and American manufacturers raised the market to 55c., at which price the market settled.

The following summary records high and low prices for bulk quinine salts on a basis of sulphate, as maintained by makers during the last thirty years:—

	High.	Low.
1916	75	50
1915	75	26
1914	31	26
1913	26	19½
1912	14	14
1911	14	14
1910	14	14
1909	15	14
1908	16	15
1907	22	16
1906	19	14½
1905	23	19
1904	27	21
1903	28	23
1902	28	20
1901	34	27
1900	37	29
1899	40	21
1898	25	18
1897	30	15
1896	27	17½
1895	28	25
1894	27½	23½
1893	25	20
1892	24	20
1891	30	24
1890	37	32
1889	40	32
1888	49	40
1887	61	35
1886	73	49

High and Low, by Months, 1916.

The following table shows the high and low prices for quinine, in bulk, on the basis of sulphate, during the last year:—

	High.	Low.
January	75	75
February	75	75
March	75	75
April	75	75
May	75	75
June	75	75
July	75	75
August	75	65
September	65	65
October	60	50
November	55	50
December	55	55
Year	75	50

Sundry Drugs and Miscellaneous Items.

Many noteworthy changes occurred in the miscellaneous drug items. Manufacturers here increased their ouput of acetanilid to such an extent that prices were lowered materially. Acetanilid opened the year at $1.10 per pound, jumped to $2.75 in April, but then weakened under freer offerings, closing in December at 48@50c. per pound. Acetphenetidin fluctuated sharply, opening around $16 per pound, but before the close of April sellers demanded $25. Prices continued to rise, touching $40 in November. At this point, however, offerings from domestic manufacturers increased and the market broke, sending the price down to $22@24 per pound toward the close of the year. Antimony needle, fine powdered, was in better supply, and the tendency of the market was downward throughout the year, opening in January at 40c. per pound and closing in December around 15c. per pound.

Heavy export shipments of alcohol featured this commodity. Demand in this country also was large, due to the activity of both munition manufacturers and color makers. Prices for all descriptions of alcohol advanced sharply. Wood alcohol was quoted in January at 55c. per gallon for the 95 per cent. Prices advanced steadily, closing at 65c. in April, 70c. in October, 75c. in November and 90c. in December. Denatured alcohol, 188 proof, advanced from 50c. per gallon in January to 64@65c. in December. High prices for raw materials were an important factor, especially in grain alcohol. The 188 proof, strictly grain, opened at $2.62 per gallon and closed the year at $2.70.

Benzol Prices Fell Away.

The course of the market for benzol was downward, as supplies were augmented through the operation of many new plants. Consumption, however, was heavy, and, comparatively speaking, the prices obtained were good. The year opened with producers demanding from 80c. to 85c. The market touched 90c. in April under active buying, but from then on the tendency was downward, prices settling in December at 58@60c. per gallon, spot delivery, with contracts quoted at 55c. Beta-naphthol, sublimed, opened at $1.50 per pound, but during the last quarter there were sellers at $1 per pound. Toluol was high over the first half of the year, selling at $4@4.50 per gallon. Stocks were larger throughout the second half, and before the close of the year there were sellers of pure toluol at $2@2.25 per gallon. Naphthaline met with a good demand and toward the close the output of some of the largest producers here was virtually sold up. Nominal quotations for flakes ranged from 8½c. to 13½c. per pound, according to quality and seller.

Contract prices for borax were raised from 5¾c. per pound to 6¾c. per pound, due to the higher cost of production. The demand for borax and borax products was fairly active throughout the year. Due to the high position of the basic materials the market for bismuth salts was firm and generally higher. Bromine was in better supply, due to increased production here, and prices were considerably lower than in 1915.

Caffeine Alkaloid.

Caffeine alkaloid was quoted at $11.50 by manufacturers throughout the first quarter, but increased business sent the price upward, the market touching $18 in May. The high price restricted business and the market weakened, business again passing around the $11.50 basis in December.

Cocaine was scarce under active buying for export and the market advanced from $3.45 to $4.25 per ounce for the hydrochloride. Russian cantharides were in scanty supply, due to the inability to obtain shipments, and prices held on a high basis. Domestic manufacturers offered cocoa butter more freely, but price fluctuations over the year were confined within narrow limits, ranging from 36 to 42c. per pound, in bulk. Coumarin was scarce and high, especially over the last quarter.

Potash Salts.

Potash salts were relatively high, owing to the scarcity of potash. New sources of supply proved inadequate and the scarcity in potash during the year was even more acute than at any time since the outbreak of the European conflict. Permanganate of potash opened the year with sellers at $1.75 per pound, but before the close of the first quarter the market was established at $1.90. Business slackened over the summer period and prices eased off, holding around $1.60. Demand improved in the fall and early winter and the year closed with prices wholly nominal at $2.50@2.75 per pound.

Quicksilver.

Owing to the large consumption of quicksilver in the manufacture of war supplies prices for this metal touched the highest point on record, namely, $300 per flask of seventy-five pounds. Consumption was stimulated by the high prices and the market closed the year at $80 per flask. The domestic output in 1916, according to preliminary figures compiled by the United States Geological Survey, was 28,942 flasks of seventy-five pounds each, valued, at the average domestic price for the year at San Francisco (estimated at $125.90 a flask), at $3,643,800. This was the greatest output in quantity since 1905 and not only the greatest in value since 1875 but, except the value of $4,228,538 for that year, was the greatest in the history of the domestic industry, dating back to 1850. Compared with the Survey's final figures of output for 1915, which gave a production of 21,033 flasks, valued at $1,826,912, the preliminary figures for 1916 show an increase of 7,909 flasks, or 38 per cent., in quantity and of $1,816,888, or 99 per cent., in value.

Glycerine.

The enormous demands for dynamite glycerine from domestic and foreign sources caused prices to hold at abnormally high levels throughout the year. The production in this country was pushed to the limit and the industry witnessed one of the most prosperous years since its inception. Owing to the shortage in oils and fats the market for raw materials was somewhat higher than in the preceding year. Imports of crude glycerine in 1916 fell off approximately 60 per cent., compared with 1915, and fully 75 per cent. compared with the 1914 total. Chemically pure glycerine opened the year at 52½@53c. per pound, bulk basis. In April sellers were asking 60c. per pound, the high point for the year. Demand was rather inactive throughout the summer period and temporary weakness in raw materials brought out generally lower prices. In August there were sellers of chemically pure glycerine on the basis of 36½c. per pound. Business was brisk over the fall months and a sharp recovery in prices was recorded. Toward the close of the year the market was firmly established around 55c. per pound.

Codliver Oil.

Codliver oil attracted widespread attention through the heavy buying of the Norwegian product by European consumers and the increase in production in Newfoundland. Competition for the Norwegian oil through the active demand from English and German interests sent the market for this commodity to record levels. As high as $160 per barrel was actually paid in Norway for unrefined oil. Total production of Norwegian oil was estimated at 76,211 hectoliters. Prices in Norway covered a range of $85 to $160 per barrel, against $20 to $80 in 1915 and $15 to $20 in 1914. Realizing that the Norwegian oil would be virtually unobtainable, the Newfoundland interests took steps to greatly increase their output of medicinal oil. The Newfoundland Government also assisted in the matter, supporting the refiners in every way possible, with a view toward standardizing the product. Exports of Newfoundland codliver oil for the fiscal year ending with June amounted to 142,637 gallons, as against 47,170 gallons for the corresponding period a year ago and 36,484 gallons in 1912-13. The year opened with Newfoundland oil quoted here at $60 per barrel. As high as $120 per barrel was asked in May and June. Competition was quite keen when new oil commenced to arrive and the price weakened, closing at $70@75 per barrel.

Menthol.

Menthol held on a fairly steady basis, due to the almost stationary position of the market at primary centers. Menthol opened the year at $3.25 per pound, eased off to $2.85 during the summer months, but again advanced under more active buying, closing at $3.20 per pound. Rochelle salts were firmer, advancing from 29½c. per pound to 35c. in May, but toward the close of the year there were sellers at 33½@34c. per pound. Benzoate of soda advanced sharply under scanty supplies, opening the year at $3.75 per pound and selling around $8.75 in October. In December benzoate of soda was quoted at $8.50 nominal. Cyanide preparations fluctuated sharply, owing to the inability of certain producers to make deliveries on time, and toward the close of the year prices for cyanide mixtures, cyanide of potash and cyanide of soda were largely nominal.

Sugar of Milk.

Sugar of milk was fairly active and prices scored an almost unbroken advance, opening the year around 14c. per pound, bulk basis, and closing at 32c. per pound. Some producers met with unforeseen delay in making contract shipments, which added to the firmness.

Due to the uplift in the market for nux vomica, manufacturers advanced their prices for strychnine alkaloid from a minimum of 70c. per ounce to 90c. per ounce. Nux vomica, whole, opened at 6c. per pound and closed at 7@7½c. per pound.

Saccharine.

Saccharine was advanced sharply under a shrinkage in stocks. In January, 1916, the market opened at $11.50 per pound, this price holding until April, when $12 was the quotation. Saccharine was quoted at $15 in July and the advance continued throughout the summer and fall months, bringing the closing to $20 per pound, with offerings scanty.

SUNDRY DRUGS AND MISCELLANEOUS ITEMS.

ACETANILID.

The following table gives the high and low prices for acetanilid for each month of 1916:—

	High.	Low.
January	1.15	1.10
February	1.65	1.15
March	1.50	2.50
April	2.50	2.00
May	2.00	2.00
June	1.20	.65
July	.65	.65
August	.65	.65
September	.60	.55
October	.54	.52½
November	.52½	.52½
December	.52½	.48
Year	2.50	.48

ACETPHENETIDIN.

The following table shows the high and low price for acephenetidin, by months, for 1916:—

	High.	Low.
January	14.00	14.00
February	22.00	14.00
March	22.00	22.00
April	25.00	24.00
May	24.00	24.00
June	24.00	24.00
July	30.00	24.00
August	34.00	30.00
September	36.00	35.00
October	41.00	37.00
November	42.00	36.00
December	32.00	22.00
Year	42.00	14.00

ALCOHOL.

The following summary of prices shows the high and low basic figures of each month of 1916 for ethyl, methyl and denatured alcohol:—

	Ethyl, 188 proof.		Refined methyl, 95%.		Denatured, 180c.	
	H.	L.	H.	L.	H.	L.
January	2.62	2.62	55	55	50	50
February	2.62	2.62	60	60	55	55
March	2.64	2.64	65	65	59	59
April	2.64	2.64	65	65	59	59
May	2.64	2.64	65	65	59	59
June	2.64	2.64	65	65	59	59
July	2.64	2.64	65	65	49	49
August	2.64	2.64	65	65	49	49
September	2.64	2.64	65	65	49	49
October	2.68	2.64	75	65	59	49
November	2.68	2.68	90	75	64	59
December	2.70	2.68	90	90	64	64
Year	2.70	2.62	90	55	64	49

The following table of price fluctuations shows the high and low figures for 95 per cent. refined wood alcohol and 180 proof denatured alcohol for each month of 1916:—

	95 per cent. wood. Per gal.		180-proof denatured. Per gal.	
	H.	L.	H.	L.
January	55	55	50	50
February	60	60	55	55
March	65	65	59	59
April	65	65	59	59
May	65	65	59	59
June	65	65	59	59
July	65	65	59	49
August	65	65	49	49
September	65	65	49	49
October	75	70	59	54
November	90	80	64	59
December	90	90	64	64
Year	90	55	64	49

BENZOATE OF SODA.

The high and low figures for sodium benzoate for each month of last year are set forth in the following table:—

	Price per lb.	
	High.	Low.
January	$3.75	$3.75
February	3.75	3.75
March	4.00	3.75
April	5.00	5.00
May	6.00	5.00
June	6.00	5.75
July	6.00	6.00
August	6.00	5.85
September	8.00	8.00
October	9.00	9.00
November	8.75	8.25
December	8.75	8.75
Year	9.00	3.75

BENZOL.

The following table shows the high and low prices named for the water white description of this hydrocarbon each month in 1916:—

	Per gallon			
	100%.		90%.	
	High.	Low.	High.	Low.
January	$0.80	$0.80	$0.80	$0.80
February	.80	.80	.80	.80
March	.90	.80	.90	.80
April	.90	.85	.90	.75
May	.80	.70	.70	.65
June	.80	.70	.75	.65
July	.80	.68	.75	.75
August	.68	.68	.75	.65
September	.68	.68	.65	.65
October	.60	.60	.65	.65
November	.60	.60	.65	.65
December	.60	.60	.60	.58
Year	.80	.60	.90	.58

BORAX.

In the following table the high and low prices for borax crystals and granulated, in sacks and barrels, are set forth for each month of 1916:—

	Cents per pound			
	In sacks.		In barrels.	
	High.	Low.	High.	Low.
January	6¾	6¾	6¾	6¼
February	6¼	6¼	6¾	6¾
March	6¼	6¼	6¾	6¾
April	6¾	6¼	7¼	6¾
May	6¾	6¾	7¼	7¼
June	6¾	6¾	7¼	7¼
July	6¾	6¾	7¼	7¼
August	6¾	6¾	7¼	7¼
September	6¾	6¾	7¼	7¼
October	6¾	6¾	7¼	7¼
November	6¾	6¾	7¼	7¼
December	6¾	6¾	7¼	7¼
Year	6¾	5¾	7¼	6¼

BROMIDES.

The following table shows the high and lo wprices for granular bromide of soda, potash and ammonia, by months, for 1916:—

	Bromide ammonium.		Bromide potassium.		Bromide sodium.	
	H.	L.	H.	L.	H.	L.
January	4.50	4.50	5.50	5.50	3.50	3.50
February	4.50	4.50	5.50	5.50	3.50	3.50
March	4.50	4.50	5.50	5.50	3.50	3.50
April	4.50	4.00	5.50	4.50	3.50	3.00
May	4.50	4.50	4.50	4.50	3.50	3.50
June	4.50	2.50	4.50	3.50	3.50	2.00
July	2.25	1.00	2.00	1.35	1.75	.80
August	1.00	1.00	1.35	1.35	1.75	1.75
September	1.00	1.00	1.35	1.35	.80	.80
October	1.00	1.00	1.35	1.35	.80	.80
November	1.00	1.00	1.35	1.35	.80	.78
December	1.00	1.00	1.35	1.35	.72	.72
Year	4.50	1.00	5.50	1.35	3.50	.72

CASTOR OIL.

The following tabulation shows the

For Export

Dyes and Dye Intermediates

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Beta Naphtol
Hematine Crystals
Metaphenylenediamine
Paraphenylenediamine
Benzidine Sulphate
Metadinitrobenzol

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high and low prices for No. 1 castor oil, in barrels, by months, for last year:—

	High.	Low.
January	18	20
February	20	20
March	20	20
April	20	20
May	20	20
June	18	16
July	15	15
August	14½	14
September	14	14
October	14	14
November	15	14
December	18	15
Year	20	14

CAFFEINE.

The following table of price fluctuations in 1916 shows the high and low figures for caffeine alkaloid in each month throughout the year:—

	Cents per pound. High.	Low.
January	$11.50	$11.50
February	11.50	11.50
March	13.00	13.00
April	18.00	13.00
May	18.00	18.00
June	18.00	17.00
July	15.00	14.25
August	14.25	13.60
September	13.00	13.00
October	18.00	12.00
November	12.00	11.50
December	11.50	11.25
Year	18.00	11.25

CHLOROFORM.

The following table shows the high and low price for chloroform, by months, during 1916:—

	High.	Low.
January	70	70
February	70	70
March	70	70
April	70	70
May	60	60
June	44	44
July	44	44
August	50	44
September	50	50
October	50	50
November	50	50
December	60	55
Year	70	44

COCOA BUTTER.

In the following table the high and low prices for cocoa butter are given for each month of 1916:—

	Cents per pounds. Bulk. High.	Low.	Wrapped fingers in 12-lb. boxes. High.	Low.
January	38	38	38	38
February	38	38	38	38
March	39½	39	40	40
April	41½	41	43½	43½
May	41	41	43	43
June	42½	41	44½	42
July	37½	39½	42	42
August	41	40	43	43
September	41	40	43	43
October	41	40	43	42
November	38	38	43	43
December	38	38	43	42
Year	42½	38	44½	38

CODLIVER OIL.

As a basis for comparison with the result of the ten previous years we append the following table, showing the production of Lofoten and total Norway oil, the total catch of fish in millions and the ruling basis for shipments of medicinal oil at the close of the season:—

	Lofoten, final hecto-liters.	Total Norway, final hecto-liters.	Fish millions, total.	Quotations, f. o. b. Norway.
1916....	15,938	60,068	80	$85.00@160.00
1915....	10,905	52,918	66½	20.50@82.50
1914....	9,619	57,200	81½	17.50@—
1913....	6,000	48,300	76	24.00@—
1912....	12,000	76,200	99	14.00@—
1911....	7,900	45,500	64¾	26.00@—
1910....	13,500	41,000	55¾	25.00@—
1909....	20,000	50,400	56½	15.00@—
1908....	20,100	59,100	48¼	13.50@—
1907....	20,400	46,400	47⅜	17.50@—
1906....	17,000	42,000	46⅜	16.00@—
1905....	11,500	41,900	45	16.00@—
1904....	3,300	17,500	50	40.00@—
1903....	600	2,800	48	120.00@—

We also append the following summary of high and low quotations for Norwegian during the last three years:—

	1914 H.	1914 L.	1915 H.	1915 L.	1916 H.	1916 L.
Jan..	23.00	23.00	21.50	20.50	95.00	78.00
Feb...	23.00	20.00	24.00	21.50	95.00	88.00
March	18.50	16.50	40.00	24.00	125.00	90.00
April.	17.00	16.50	39.00	37.00	150.00	120.00
May..	17.00	16.00	42.00	35.00	150.00	150.00
June..	18.00	17.00	45.00	40.00	150.00	140.00
July..	17.00	17.00	75.00	45.00	140.00	140.00
Aug..	26.00	17.00	80.00	70.00	140.00	140.00
Sept..	22.00	20.00	82.50	80.00	138.00	138.00
Oct...	19.00	18.00	82.50	80.00	135.00	135.00
Nov..	18.00	17.50	80.00	77.50	130.00	120.00
Dec...	20.00	17.50	80.00	76.00	130.00	115.00
Year..	26.00	16.00	82.50	20.50	150.00	78.00

A record of the high and low prices asked for Newfoundland codliver oil in the New York market in 1916 follows:—

	High.	Low.
January	70.00	65.00
February	80.00	73.00
March	95.00	73.00
April	125.00	115.00
May	120.00	120.00
June	120.00	120.00
July	130.00	95.00
August	80.00	80.00
September	72.00	72.00
October	85.00	70.00
November	77.00	75.00
December	72.00	72.00
Year	130.00	65.00

CORN SYRUP AND CORN SUGAR.

The high and low figures for corn syrup and corn sugar in each month of last year are set forth in the following table:—

	Per 100 pounds. Corn syrup, 42 degrees. High.	Low.	Corn sugar, "pure food." High.	Low.
January	$2.31	$2.26	$2.21	$2.18
February	2.31	2.31	2.21	2.21
March	2.21	2.21	2.11	2.11
April	2.21	2.21	2.11	2.11
May	2.41	2.41	2.31	2.31
June	2.31	2.31	2.31	2.31
July	2.51	2.41	2.41	2.31
August	2.71	2.71	2.71	2.71
September	2.81	2.71	2.81	2.71
October	3.11	2.71	3.11	2.71
November	3.11	3.01	3.11	3.01
December	3.21	3.01	3.21	3.01
Year	3.21	2.21	3.21	2.11

COUMARIN.

The following table shows the high and low figures reached by coumarin each month in 1916:—

	Per pound. High.	Low.
January	$7.00	$7.00
February	7.00	7.00
March	7.75	7.00
April	10.00	8.25
May	10.00	10.00
June	9.75	9.75
July	9.75	9.75
August	9.75	9.40
September	9.50	9.50
October	9.75	9.50
November	9.75	9.70
December	10.75	9.70
Year	10.75	7.00

EPSOM SALT, U. S. P.

The following table shows the high and low price for epsom salt, U. S. P., by months, for 1916:—

	High.	Low.
January	3¾	3¾
February	4	3¾
March	3¾	3¾
April	3½	3½
May	3½	2¾
June	2¾	2¾
July	2¾	2¾
August	2¾	2¼
September	1¾	1¾
October	1¾	1¾
November	1¾	1¾
December	2	1¾
Year	4	1¾

ERGOT.

In the appended table there will be found the high and low prices reached by Russian and Spanish ergot each month in 1916:—

	Cents per pounds. Russian. High.	Low.	Spanish. High.	Low.
January	75	75	85	85
February	75	75	85	85
March	75	75	85	85
April	75	75	85	75
May	75	75	75	75
June	75	75	75	75
July	75	73	75	75
August	73	72	80	75
September	68	68	75	75
October	70	70	75	72½
November	70	70	70	70
December	68	68	68	68
Year	68	68	85	72½

FUSEL OIL.

In the subjoined table will be found the high and low figures reached for crude and refined fusel oil in each month of the last year:—

	Domestic. Crude, per pound. High.	Low.	Refined, per pound. High.	Low.
January	$3.50	$3.45	$5.50	$5.25
February	3.50	3.50	5.00	5.00
March	3.80	3.50	5.00	5.00
April	4.60	3.75	5.50	4.75
May	4.50	4.50	6.25	6.25
June	4.50	4.50	6.25	6.25
July	4.50	4.87½	6.25	6.00
August	4.50	4.50	5.50	5.50
September	4.50	4.10	5.50	5.25
October	4.10	4.00	5.25	5.25
November	4.00	4.00	5.25	5.25
December	4.00	3.50	5.25	3.85
Year	4.60	3.45	6.25	3.85

GLYERINE.

The following summary shows the prevailing range of high and low quotations for C. P. glycerine during 1916:—

GLYCERINE, C. P.

	Cents per lb. High.	Low.
January	53	52½
February	51	50
March	58	54
April	60	58
May	60	58
June	52	50
July	45	43½
August	36½	36½
September	42½	40
October	52½	45
November	53½	52½
December	55	52½
Year	60	36½

A record of the highest and lowest figures for the four previous years follows:—

	High.	Low.		High.	Low.
1915.....	65	19¼	1913.....	21	18¾
1914.....	27	19¾	1912.....	20	16

HAARLEM OIL.

The following table of price fluctuations in 1915 shows the high and low figures for each month throughout the year:—

	Per gross bottles. High.	Low.
January	$2.00	$2.00
February	2.10	2.00
March	2.35	2.10
April	2.75	2.35
May	3.00	2.65
June	2.60	2.60
July	2.55	2.50
August	2.50	2.50
September	2.50	2.50
October	2.85	2.75
November	2.85	2.85
December	3.00	2.85
Year	3.00	2.00

HYPOPHOSPHITES.

In the following table the high and low prices for hypophosphites of lime, potash and soda are set forth for each month of 1916:—

	Cents per pound. Lime. H.	L.	Potash. H.	L.	Soda. H.	L.
January	77	77	92	92	82	82
February	77	77	92	92	82	82
March	77	77	1.50	92	82	82
April	77	77	1.50	1.50	82	82
May	77	77	1.50	1.50	82	82
June	77	77	1.50	1.50	82	82
July	77	77	1.50	1.50	82	82
August	77	77	1.50	1.50	82	82
September	77	77	1.50	1.50	82	82
October	77	77	1.50	1.50	82	82
November	77	77	1.50	1.50	82	82
December	77	77	1.50	1.50	82	82
Year	77	77	1.50	92	82	82

LYCOPODIUM.

In the following table the high and low prices for lycopodium are given for each month of 1916:—

	Per pound. High.	Low.
January	1.75	$1.75
February	1.75	1.75
March	2.75	1.75
April	3.25	2.75
May	3.25	3.25
June	3.25	3.25
July	3.60	3.60
August	3.00	2.00
September	1.90	1.70
October	1.45	1.40
November	1.35	1.20
December	1.20	1.15
Year	3.60	1.15

MANNA.

The following table shows the high and low figures reached for large and small flake manna in each month of 1916:—

	Per pound. Large. High.	Low.	Small. High.	Low.
January	$1.25	$1.25	$0.85	$0.85
February	1.25	1.25	.85	.85
March	1.25	1.25	.85	.85
April	1.25	1.25	.85	.80
May	1.25	1.25	.80	.80
June	1.25	1.25	.80	.80
July	1.25	1.25	.80	.80
August	1.35	1.25	.85	.80
September	1.35	1.25	.95	.85
October	1.65	1.25	1.35	.95
November	1.65	1.65	1.35	.90
December	1.65	1.65	.90	.90
Year	1.65	1.25	1.35	.80

MENTHOL.

The following summary shows the high and low prices for each month during the last year:—

	Per pound. High.	Low.
January	$3.25	$3.10
February	3.25	3.10
March	3.25	3.25
April	3.25	3.10
May	3.15	3.00
June	3.00	2.85
July	2.75	2.75
August	3.10	3.00
September	3.25	3.00
October	3.40	3.20
November	3.15	3.15
December	3.25	3.20
Year	3.40	2.75

High and low quotations for the years 1895 to 1916 follow:—

	High.	Low.		High.	Low.
1895.....	$4.75	$4.00	1906.....	$2.90	$2.15
1896.....	4.75	2.50	1907.....	2.60	1.90
1897.....	4.20	1.85	1908.....	2.15	1.85
1898.....	2.60	2.00	1909.....	2.75	2.05
1899.....	3.00	1.20	1910.....	3.45	2.60
1900.....	3.90	2.35	1911.....	7.00	3.45
1901.....	4.75	3.50	1912.....	14.00	6.00
1902.....	7.00	3.80	1913.....	10.25	2.70
1903.....	8.00	5.25	1914.....	4.75	2.35
1904.....	6.25	2.50	1915.....	3.50	2.50
1905.....	3.00	1.75	1916.....	3.40	2.75

MERCURIALS.

Hard.

In the appended table there will be found the high and low prices for 50-pound lots reached each month in 1916 by the hard mercurials—calomel, bisulphate of mercury and red and white precipitates:—

CALOMEL. (American.)

	High.	Low.
January	$2.75	$1.88
February	3.43	3.43
March	3.43	3.43
April	3.08	2.28
May	1.70	1.53
June	1.36	1.36
July	1.36	1.36
August	1.36	1.36
September	1.36	1.36
October	1.36	1.36
November	1.43	1.36
December	1.43	1.43
Year	3.43	1.36

	Mercury bisulphate. High.	Low.	Precipitates. Red. High.	Low.	White. High.	Low.
January	$2.44	$1.50	$2.03	$2.06	$3.03	$2.18
February	3.04	3.04	3.68	3.68	3.78	3.78
March	3.04	3.04	3.68	3.68	3.78	3.78
April	2.74	1.94	3.38	2.58	3.48	2.68
May	1.18	1.36	1.87	1.68	1.97	1.78
June	1.00	1.00	1.49	1.49	1.59	1.59
July	1.00	1.00	1.49	1.49	1.59	1.59
August	1.00	1.00	1.49	1.49	1.59	1.59
September	1.00	1.00	1.49	1.49	1.59	1.59
October	1.00	1.00	1.49	1.49	1.59	1.59
November	1.07	1.00	1.57	1.49	1.67	1.59
December	1.07	1.07	1.57	1.57	1.67	1.67
Year	3.04	1.00	3.68	1.49	3.78	1.59

Soft.

In the subjoined table will be found the high and low figures reached by the soft mercurials—blue mass and mercurial ointments—in each month of the last year:—

	Per pound. Blue mass. High.	Low.	Mercurial ointment. 33⅓% High.	Low.	50% High.	Low.
January	$1.35	$0.93	$1.43	$1.01	$1.53	$1.11
February	1.70	1.70	1.73	1.73	2.03	2.03
March	1.70	1.70	1.73	1.73	2.03	2.03
April	1.55	1.05	1.58	1.08	1.78	1.33
May	.75	.65	.78	.68	1.03	.93
June	.58	.58	.61	.61	.83	.83
July	.58	.58	.61	.61	.83	.83
August	.58	.58	.61	.61	.83	.83
September	.58	.58	.61	.61	.83	.83
October	.58	.58	.61	.61	.83	.83
November	.60	.58	.63	.61	.86	.83
December	.60	.60	.63	.63	.86	.86
Year	1.70	.60	1.73	.61	2.03	.83

NAPTHALINE.

The following table shows the high and low price of pure white naphthaline flakes, by months, during 1916:—

	High.	Low.
January	13	13
February	14	13
March	15	14
April	15	14
May	14	14
June	12½	11½
July	10½	8
August	8	8
September	8	8
October	8	8
November	8	8
December	9½	9½
Year	15	8

NUX VOMICA.

In the appended table there will be found the high and low prices for whole nux vomica reached each month in 1916:—

	Cents per lb. High.	Low.
January	6	6
February	6	6
March	7½	7½
April	7	7
May	7	7
June	7	7
July	7	7
August	7	7
September	6½	6½
October	6½	6½
November	6	6
December	6½	6
Year	7½	6

PARAFFINE.

The following table shows the high and low price of refined domestic paraffine wax, 118 to 120 degrees melting point, by months, for 1916:—

	High.	Low.
January	3¾	3¾
February	3¾	3¾
March	5	5
April	6½	6
May	6½	6½
June	6½	6½
July	6½	6½
August	6½	6½
September	6½	6½
October	6½	6½
November	6½	6½
December	6½	6½
Year	6½	3¾

PERMANGANATE OF POTASH.

In the subjoined table will be found the high and low figures reached by potassium permanganate in each month of the last year:—

	High.	Low.
January	$1.75	$1.75
February	1.90	1.75
March	1.90	1.85
April	1.90	1.90
May	1.90	1.65
June	1.65	1.60
July	1.60	1.60
August	1.60	1.60
September	1.75	1.65
October	2.35	1.85
November	2.50	2.40
December	2.75	2.50
Year	2.75	1.60

QUICKSILVER.

The high and low figures for quicksilver in flask and jobbing lots in each month of last year are set forth in the following table:—

	Per flask of 75 pounds. High.	Low.	Per pound. High.	Low.
January	$300.00	$175.00	$4.00	$2.35
February	300.00	275.00	4.00	4.00
March	250.00	200.00	3.50	2.75
April	180.00	120.00	2.55	1.90
May	100.00	75.00	1.75	1.30
June	76.00	70.00	1.20	1.00
July	80.00	80.00	1.10	1.10
August	80.00	75.00	1.10	1.10
September	76.00	75.00	1.10	1.05
October	80.00	78.00	1.05	1.05
November	80.00	80.00	1.05	1.05
December	80.00	80.00	1.05	1.05
Year	300.00	70.00	4.00	1.00

ROCHELLE SALTS AND SEIDLITZ MIXTURE.

The following table shows the high and low figures reached by the rochelle salts and seidlitz mixture in each month of 1916:—

	Cents per pound. Rochelle salts. High.	Low.	Seidlitz mixture. High.	Low.
January	30½	29½	23¾	23
February	32½	31½	25	24½
March	33½	32½	25¾	25
April	35½	33½	27¼	25¾
May	35½	35½	27¼	27¼
June	35½	35½	27¼	25½
July	35½	34	27¼	26
August	34	34	26	26
September	34	34	26	26
October	34	34	26	26
December	34	34	26	26
Year	34	33½	26	26

SACCHARINE.

In the following table the high and low prices of saccharine are set forth for each month of 1916:—

	Per pound. High.	Low.
January	$11.50	$11.50
February	11.50	11.50
March	11.50	11.50
April	13.50	11.50
May	13.50	13.50
June	13.50	11.50
July	17.00	16.00
August	20.00	18.50
September	20.00	20.00
October	20.00	20.00
November	20.00	20.00
December	20.00	20.00
Year	20.00	11.50

SALOL.

In the following table the high and low prices asked for salol, in bulk, by domestic manufacturers of regular customers and by second hands for outside lots are given for each month of 1916:—

	Per pound. Manufacturers'. High.	Low.	Second hands. High.	Low.
January	$2.75	$2.75	$9.50	$9.25
February	2.75	2.75	9.50	9.50
March	2.75	2.75	9.50	9.50
April	2.75	2.75	9.75	9.50
May	3.75	3.75	8.50	8.00
June	3.75	3.75	7.00	7.00
July	3.75	3.75	7.00	7.00
August	3.75	3.75	7.00	3.90
September	3.50	3.50	3.30	3.30
October	3.50	3.25	3.30	3.25
November	3.25	2.50	3.00	2.50
December	2.50	2.50	2.35	2.25
Year	3.75	2.50	9.50	2.25

SANTONINE.

The following table of price fluctuations in 1916 shows the high and low figures for santonine crystals, in bulk, in each month throughout the year:—

	Per pound. High.	Low.
January	$38.00	$38.00
February	38.00	38.00
March	38.00	38.00
April	38.00	38.00
May	38.00	38.00
June	38.00	35.00
July	35.00	35.00
August	35.00	35.00
September	35.00	35.00
October	35.50	35.00
November	36.00	35.50
December	36.00	36.00
Year	38.00	35.00

STRYCHNINE.

The following table shows the high and low figures for strychnine sulphate in each month of 1916:—

CRYSTALS, BULK.

	Cents per ounce. High.	Low.
January	80	70
February	80	80
March	90	90
April	90	90
May	90	90
June	90	90
July	90	90
August	90	90
September	90	90
October	90	90
November	90	90
December	1.10	90
Year	1.10	70

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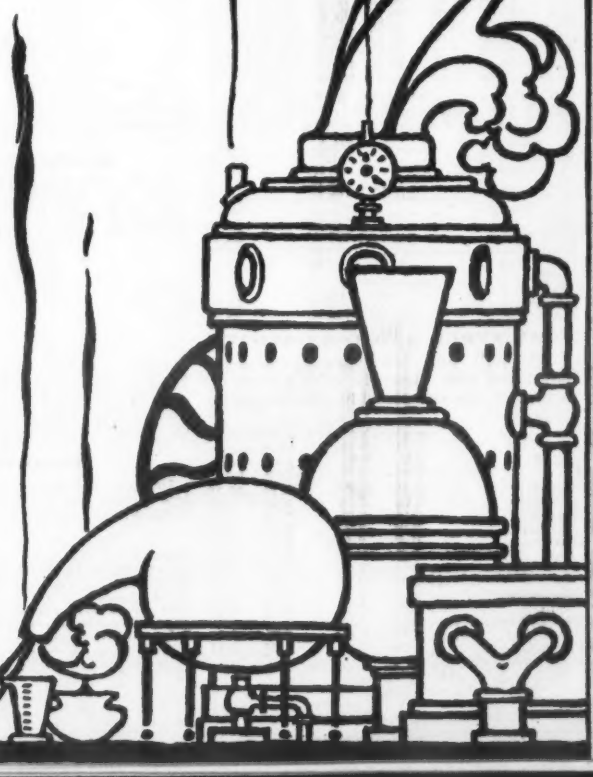

SUGAR OF MILK.

In the appended table there will be found the high and low prices for powdered sugar of milk reached each month in 1915:—

	Cents per pound—High.	Low.
January	14	14
February	14	14
March	14	14
April	17	16
May	17	17
June	20	17
July	20	20
August	23	20
September	23	23
October	23	23
November	28	27
December	32	28
Year	32	14

TARTAR EMETIC.

In the subjoined table will be found the high and low figures for the technical grade in casks reached in each month of the last year:—

	Cents per pound—High.	Low.
January	41	47
February	51	47
March	53	53
April	55	55
May	55	55
June	55	55
July	55	55
August	55	55
September	55	55
October	55	55
November	55	55
December	55	55
Year	55	47

THYMOL.

The high and low figures for thymol in each month of last year are set forth in the following table:—

	Per pound—High.	Low.
January	$12.00	$12.00
February	12.00	12.00
March	12.00	12.00
April	11.00	11.00
May	11.00	11.00
June	10.00	10.60
July	10.00	10.00
August	10.00	10.00
September	9.50	9.50
October	9.50	9.50
November	10.00	10.00
December	10.25	10.00
Year	12.00	9.50

TOLUOL.

The following table shows the high and low figures reached by pure toluol each month in 1916:—

	Per gallon—High.	Low.
January	$4.75	$4.00
February	4.00	4.00
March	4.00	4.00
April	4.00	4.00
May	4.50	4.50
June	4.50	4.50
July	4.00	4.00
August	4.00	3.75
September	3.50	3.50
October	3.00	2.25
November	2.25	2.25
December	2.25	2.05
Year	4.75	2.05

ACIDS.

A noteworthy increase in the domestic production of carbolic acid was the feature in the market for acids. While no estimates on the production were available, yet the increase was sufficient to bring out a sharp reduction in prices, amounting to approximately 60 per cent. The year opened with carbolic crystals, in drums, quoted at $1.30 per pound. Freer offerings, however, soon weakened the situation, and by the close of the first quarter there were sellers at $1.10. In May the market broke to 86c. per pound, and during July there were offerings as low as 60c. The tendency over the fall months also was downward, and the year closed with the nominal quotation barely steady at 55c. per pound.

Owing to the scanty offerings of true benzoic acid, the market for this material was wholly nominal. Benzoic acid ex-toluol scored a sharp advance, especially in the last quarter. January, 1916, found sellers at $3.50 per pound; in June $6.75 was paid, and in September, $8.25 represented the market. In October the price was raised to $11 per pound. At this period offerings from domestic producers increased, and an easier tendency was in evidence. The market closed the year at $8.50@9 per pound.

Citric acid was advanced in sympathy with the higher cost of the crude material. The year opened with manufacturers asking 59c. per pound for the crystals. Manufacturers raised the market to 64c. in February, and again jumped the prices to 67c. in July, which figure was maintained up to the close.

Picric met with an active demand from explosive makers and the market was maintained on a high basis throughout the year. Over the first half prices ranged from $1 to $1.50 per pound. During the last quarter, however, the buying was less active and there were sellers around 80@90c. per pound, spot delivery.

Salicylic acid was reduced sharply, due to the successful efforts on the part of domestic producers to increase their output. The year opened with salicylic acid quoted nominally at $3.90 @4 per pound. Manufacturers were sellers in December as low as $1.25 per pound, with second hands doing a limited business at $1 per pound.

ACIDS.

Citric and the Citrates.

Below are set forth the high and low prices for citric acid and the citrates in each month of 1916:—

	Per pound—Manufacturers' prices for crystals, in barrels. High.	Low.	Second-hand prices for crystals, in barrels. High.	Low.
January	$0.64	$0.59	$0.75	$0.61
February	.64	.64	.72½	.70
March	.64	.64	.70	.70
April	.64	.64	1.00	.85
May	.64	.64	.80	.72
June	.67	.64	.75	.72½
July	.67	.67	.67½	.67½
August	.67	.67	.67½	.62
September	.67	.67	.62	.62
October	.67	.67	.65	.62
November	.67	.66	.67	.62½
December	.65	.65	.65	.65
Year	.67	.59	1.00	.61

Carbolic.

The following table shows the high and low figures reached by U. S. P. phenol in each month of 1916:—

	Per pound—In drums. High.	Low.	In 1-lb. bottles. High.	Low.
January	$1.35	$1.30	$1.35	$1.35
February	1.25	1.15	1.35	1.35
March	1.10	1.10	1.29	1.29
April	.90	.85	1.19	1.10
May	.80	.73	1.02	.95
June	.73	.69	.93	.75
July	.52½	.52½	.72	.55
August	.55	.54	.65	.65
September	.57½	.55	.65	.65
October	.55	.55	.63	.61
November	.55	.55	.60	.60
December	.55	.55	.60	.60
Year	1.35	.52½	1.35	.55

Picric.

In the following table the high and low prices for picric acid are set forth for each month of 1916:—

	Per pound—High.	Low.
January	$1.50	$1.00
February	1.00	1.00
March	1.00	1.00
April	1.00	1.00
May	1.50	1.00
June	1.50	1.50
July	1.50	1.50
August	1.50	1.25
September	1.00	1.00
October	.90	.90
November	.90	.80
December	.80	.80
Year	1.50	.80

Salicylic.

The following table of price fluctuations in 1916 shows the high and low figures for salicylic acid in each month throughout the year:—

	Per pound—High.	Low.
January	$4.00	$3.90
February	3.90	3.90
March	4.00	4.00
April	4.25	4.25
May	3.75	3.50
June	3.40	3.40
July	2.25	2.25
August	2.25	2.10
September	1.75	1.50
October	1.50	1.50
November	1.35	1.20
December	1.00	1.00
Year	4.25	1.00

Tannic.

In the following table the high and low prices for tannic acid are set forth for each month of 1916:—

	Per pound—U. S. P. bulk. High.	Low.
January	$0.85	$0.80
February	.85	.85
March	1.00	1.00
April	1.00	1.00
May	1.00	1.00
June	1.00	1.00
July	1.00	1.00
August	1.00	1.00
September	1.00	1.00
October	1.00	1.00
November	1.00	1.00
December	1.00	1.00
Year	1.00	.80

BALSAMS.

Balsam copaiba was considerably higher in price than during the preceding year. The market opened at 50c. A shortage in supplies during May sent the quotation to a 70c. basis. Offerings were freer the second half of the year, and the market settled in December at 62½@65c. per pound. Canada fir held on a steady basis throughout the year, prices ranging from $5 to $5.50 per gallon. Oregon fir was quoted from 65c. to 87½c. Balsam Peru was in better supply, and the market registered an unbroken reduction in prices from $5.25 to $3.45. Tolu was featureless, prices covering a range of but 3c., selling from 36c. low and 39c. high.

BALSAMS.

Copaiba.

The following table shows the range of quotations for natural South American and Para balsam copaiba for each month in 1916:—

	Genuine—South American. High.	Low.	Para. High.	Low.
January	$0.50	$0.45	$0.50	$0.43
February	.60	.50	.60	.55
March	.70	.60	.70	.60
April	.70	.70	.70	.65
May	.70	.70	.70	.65
June	.67	.66	.65	.65
July	.65	.65	.60	.60
August	.64	.63	.60	.52½
September	.63	.63	.52½	.52½
October	.62½	.62½	.52½	.50
November	.62½	.62½	.52½	.50
December	.62½	.62½	.48	.48
Year	.70	.45	.70	.43

Fir Balsam.

In the following table the high and low prices for Canada and Oregon fir balsam are given for each month of 1916:—

	Per gallon—Canada. High.	Low.	Oregon. High.	Low.
January	$5.00	$5.00	$0.65	$0.65
February	5.00	5.00	.65	.65
March	5.50	5.00	.87½	.70
April	5.00	5.00	.80	.75
May	5.00	5.00	.75	.75
June	5.50	5.50	.75	.75
July	5.50	5.50	.75	.75
August	5.50	5.00	.75	.75
September	5.00	5.00	.75	.75
October	5.00	5.00	.75	.75
November	5.00	5.00	.75	.75
December	5.50	5.25	.75	.75
Year	5.50	5.50	.87½	.65

Balsam Peru.

Below are set forth the high and low prices for balsam Peru in each month of 1916:—

	Per pound—High.	Low.
January	$5.25	$5.25
February	5.00	5.00
March	4.75	4.00
April	4.00	4.00
May	4.00	3.90
June	3.90	3.90
July	3.75	3.50
August	3.50	3.50
September	3.50	3.50
October	3.50	3.50
November	3.50	3.50
December	3.65	3.45
Year	5.25	3.45

Balsam Tolu.

Below are set forth the high and low prices for balsam tolu in each month of 1916:—

	Per pound—High.	Low.
January	$0.38	$0.38
February	.38	.38
March	.39	.38
April	.38	.37
May	.38	.38
June	.38	.38
July	.37	.37
August	.37	.36
September	.36	.36
October	.37	.36
November	.37	.37
December	.37	.37
Year	.39	.36

BARKS.

There was a steady tone to the market for cascara, prices being higher than in 1915. Business was active, both in an export and domestic way. The year opened with new peel quoted at 6½@7c. per pound. Prices advanced under good buying and by the close of July the inside price was firmly established at 8c. In September offerings of scattered parcels eased off prices and 7½c. could have been done. However, towards the close of the year the tone was firm and nominal prices ranged from 8½c. to 9½c. per pound. Condurango opened at 25c., but declined under improved supplies and the market closed at 14c. per pound. Cottonseed sold in the local market from 7½c. to 8c. over the entire period. Elm bark established a low price of 16c. and a high of 18c. Lemon peel was inactive and nominal at 5c. Prickley ash prices varied but slightly compared with 1915, holding at 10@11c. per pound. Whole soap bark was quoted from 7¾c. to 8¼c. per pound, as against a range of 7½@10c. in 1915. Wahoo of root sold from 26c. to 33c., which compares with 33@36c. during the previous year, while the bark of tree was quoted from 12c. to 14c., against 13@15c. i'n 1915.

BARKS.

Condurango.

Below are set forth the high and low prices for condurango bark in each month of 1916:—

	Cents per pound—High.	Low.
January	25	25
February	25	25
March	25	25
April	25	22
May	22	22
June	22	22
July	22	21
August	21	20
September	19	19
October	19	19
November	14	14
December	14	14
Year	25	14

Cascara Sagrada.

The following table shows the highest and lowest prices by months during the last year, based on the figures for new bark, older goods usually bringing a premium of 1@3c.

	Cents per pound—High.	Low.
January	6½	6½
February	6½	6½
March	7½	7½
April	7¾	7¾
May	7½	7½
June	7½	7½
July	8	7½
August	7½	7½
September	7½	7½
October	8½	7¾
November	9½	9½
December	8½	8½
Year	9½	6½

Cottonroot.

Below are set forth the high and low prices for cottonroot bark in each month of 1916:—

	Cents per pound—High.	Low.
January	7½	7½
February	7½	7½
March	7½	7½
April	7½	7½
May	7½	7½
June	7½	7½
July	7½	7½
August	7½	7½
Septemter	7¾	7½
October	7½	7½
Noevmber	76½	7½
December	8	8
Year	8	7½

Elm.

The following table shows the high and low prices for each month of 1916 for elm bark:—

	Cents per pound—High.	Low.
January	18	18
February	18	18
March	18	18
April	18	18
May	18	18
June	18	18
July	16	16
August	16	16
September	16	16
October	16	16
November	16	16
December	16	16
Year	18	16

Lemon Peel.

Below are set forth the high and low prices for lemon peel in each month of 1916:—

	Cents per pound—High.	Low.
January	5	5
February	5	5
March	5	5
April	5	5
May	5	5
June	5	5
July	5	5
August	5	6
September	5	5
October	5	5
November	5	5
December	5	5
Year	5	5

Prickly Ash.

In the following table the high and low prices for prickly ash bark are given for each month of 1916:—

	Northern & Southern. Cents per pound—High.	Low.
January	10	10
February	10	10
March	10	10
April	10	10
May	10	10
June	10	10
July	10	10
August	10	10
September	10	10
October	10	10
November	11	11
December	11	11
Year	11	10

Soap.

Below are set forth the high and low prices for soap bark in each month of 1916:—

	Whole. H.	L.	Cut. H.	L.	Crushed. H.	L.
January	7¾	7¾	15	15	9	9
February	7¾	7¾	15	15	9	9
March	8	8	15	15	9½	9½
April	8	8	15	11	9½	9½
May	8	8	11	11	9½	9½
June	8½	8	15	11	10	9½
July	8	8	15	11	10	9½
August	8	8	11	11	9½	9½
September	8	8	15	15	9½	9½
October	8	8	15	15	9½	9½
November	8	8	15	15	9½	9½
December	8	8	15	15	9½	9½
Year	8¼	7¾	15	11	10	9

Wahoo.

The following table shows the high and low prices for each month of 1916 for wahoo bark of root and tree:—

	Per pound—Bark of root. High.	Low.	Bark of tree. High.	Low.
January	33	33	12	12
February	33	33	12	12
March	33	33	12	12
April	23	26	12	12
May	26	26	12	12
June	26	26	12	12
July	26	26	12	12
August	26	26	12	12
September	26	26	12	12
October	26	26	12	12
November	30	30	12	12
December	30	30	14	14
Year	33	26	14	12

BERRIES.

The high position of freights and the general uplift in war risk rates affected imported lines. Juniper berries were in steady demand and prices ruled firm, opening the year at 4c. per pound and closing at 5c., with offerings at this figure moderate. Cubeb berries held around 42½@45c. per pound for the ordinary stock throughout the year, being virtually unchanged compared with the 1915 season. Prickley ash berries ranged in price from 11c. to 13c. per pound, as against 12@15c. a year ago.

BERRIES.

Cubebs.

The following table shows the high and low prices in each month of 1916 for cubeb berries:—

	Cents per pound—Ordinary. H.	L.	XX. H.	L.	Powdered. H.	L.
January	42½	42½	47½	47½	45	45
February	42½	42½	47½	47½	45	45
March	42½	42½	47½	47½	45	45
April	42½	42½	47½	47½	45	45
May	42½	42½	47½	47½	45	45
June	42½	42½	47½	47½	45	45
July	42½	42½	47½	47½	45	45
August	42½	42½	47½	47½	45	45
September	42½	42½	47½	47½	45	45
October	42½	42½	47½	47½	45	45
November	42½	42½	47½	47½	45	45
December	42½	42½	47½	47½	45	45
Year	42½	42½	47½	47½	45	45

Juniper.

Below are set forth the high and low prices for juniper berries in each month of 1916:—

	Cents per pound—High.	Low.
January	4	4
February	4¼	4¼
March	4½	4¼
April	4½	4½
May	4½	4½
June	4¼	4¼
July	4¼	4¼
August	4¼	4¼
September	4¼	4¼
October	4½	4¼
November	4¾	4¾
December	5	5
Year	5	4

PRICKLY ASH.

In the following table the high and low prices for prickly ash berries are given for each month of 1916:—

	Per pound—High.	Low.
January	$0.13	$0.13
February	.13	.13
March	.13	.13
April	.11	.11
May	.11	.11
June	.11	.11
July	.11	.11
August	.11	.11
September	.12	.11
October	.12	.12
November	.12	.12
December	.12	.12
Year	.13	.11

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BEANS.

Owing to the damage to the vines sustained in the fall of 1915, through the severe tropical storms, the 1915-16 crop of vanilla beans in Mexico suffered materially. The total crop consisted of approximately 200,000 pounds, of which 125,000 pounds were whole beans and 75,000 pounds cuts. This total is about 50 per cent. short of normal. With the outlook for the 1916-17 season also poor, the position of the market was strong throughout the year and high prices were the rule. The political disturbances in Mexico had a strengthening influence upon the market, especially as shipments were interrupted upon several occasions. According to customs figures, the vanilla bean harvest in Guadeloupe during the 1915-16 season amounted to 63,416 pounds, 57,129 pounds of which were shipped to the United States. The Bourbon crop turned out better than expected, but in sympathy with the Mexican product prices held on a fairly high basis. Prices for Tahiti beans also ruled steady. Inside quotations for whole Mexican beans during the year ranged from a minimum of $3.75 per pound to $5 per pound, while prices for Mexican cuts ranged from $2.25 to $3.75 per pound. Bourbons were quoted from $2.50 to $2.75 per pound on average quality goods. Tahiti beans, green label, sold from $1.40 to $1.60 per pound, spot delivery.

Tonka beans were in better supply and average prices during 1916 were somewhat lower than in 1915. The demand from tobacco manufacturers was up to normal. Angostura tonka beans were quoted during the year from 80c. to 90c. per pound, which compares with 90c. to $1.05 per pound in the preceding year. Calabar beans were rather featureless, selling from 20c. to 22c., as against 20@25c. in 1915.

CALABAR BEANS.

In the following table the high and low prices for calabar beans are given for each month of 1916:—

	Per pound— High.	Low.
January	$0.20	$0.20
February	.20	.20
March	.20	.20
April	.22	.22
May	.22	.22
June	.22	.22
July	.22	.22
August	.22	.22
September	.22	.22
October	.22	.22
November	.22	.22
December	.22	.22
Year	.22	.20

TONKA BEANS.

Below are set forth the high and low prices for tonka beans in each month of 1916:—

	Per pound— Angostura. High.	Low.	Para. High.	Low.	Surinam. High.	Low.
January	$0.90	$0.90	$0.65	$0.65	$0.75	$0.75
February	.90	.90	.65	.65	.75	.75
March	.90	.90	.65	.65	.70	.75
April	.90	.90	.55	.55	.70	.70
May	.90	.90	.55	.55	.70	.70
June	.85	.80	.55	.55	.70	.70
July	.82½	.82½	.50	.50	.70	.70
August	.82½	.80	.50	.50	.70	.70
September	.85	.85	.50	.50	.65	.65
October	.85	.85	.50	.50	.60	.60
November	.85	.85	.55	.50	.60	.60
December	.85	.85	.55	.55	.60	.60
Year	.90	.80	.65	.50	.75	.60

VANILLA BEANS.

Comparison of three leading kinds.

Below are set forth the high and low prices for Mexican, Bourbon and Tahiti vanilla beans in each month of 1916:—

	Per pound— Mexican, Whole. High.	Low.	Bourbon. High.	Low.	Tahiti, Green. High.	Low.
January	$4.00	$3.75	$2.50	$2.50	$1.45	$1.40
February	4.00	4.00	2.75	2.50	1.40	1.40
March	4.00	4.00	2.75	2.75	1.40	1.40
April	4.00	4.00	2.75	2.75	1.40	1.40
May	4.50	4.00	2.75	2.75	1.40	1.40
June	4.25	4.25	2.53	2.50	1.60	1.60
July	4.50	4.25	2.60	2.60	1.60	1.60
August	4.50	4.50	2.60	2.60	1.60	1.60
September	4.50	4.50	2.60	2.60	1.60	1.60
October	5.00	4.50	2.60	2.60	1.60	1.60
November	5.00	5.00	2.60	2.60	1.60	1.60
December	4.75	4.75	2.50	2.50	1.60	1.60
Year	5.00	3.75	2.75	2.50	1.60	1.40

MEXICAN.

Whole.

A summary of the high and low prices for Mexican whole beans during recent years follows, the basis being the cheapest goods on the market:—

MEXICAN WHOLE BEANS.

	Per pound— High.	Low.
1900	$11.00	$9.00
1901	9.00	6.75
1902	6.75	4.75
1903	6.50	5.00
1904	5.00	3.75
1905	3.50	2.75
1906	2.75	2.75
1907	4.25	2.75
1908	4.25	3.00
1909	3.25	2.75
1910	3.37½	2.75
1911	4.00	2.75
1912	5.00	3.50
1913	4.00	3.62½
1914	5.00	3.50
1915	3.75	2.50
1916	5.00	3.75

CUTS.

A comparison of quotations for Mexican cuts in the local trade is afforded by the following summary:—

MEXICAN CUTS.

	Per pound— High.	Low.
1900	$9.00	$7.75
1901	8.00	5.75
1902	5.75	3.25
1903	4.00	3.50
1904	3.50	2.50
1905	2.50	1.50
1906	2.15	1.75
1907	3.87½	2.00
1908	3.75	2.00
1909	2.62½	2.25
1910	3.12½	2.25
1911	3.75	2.37½
1912	3.85	3.20
1913	3.25	3.20
1914	3.50	2.75
1915	3.25	2.25
1916	3.75	3.25

BOURBON BEANS.

The following table shows the high and low levels of Bourbon vanilla beans in the local market during the last fifteen years:—

BOURBON BEANS.

	Per pound— High.	Low.
1900	$4.50	$4.00
1901	4.75	3.00
1902	3.00	2.50
1903	2.50	1.50
1904	1.50	1.50
1905	1.50	1.00
1906	1.50	1.00
1907	3.00	1.25
1908	3.00	1.50
1909	3.00	1.75
1910	3.00	2.75
1911	3.75	2.75
1912	4.50	3.00
1913	3.10	2.75
1914	4.50	2.75
1915	3.50	2.25
1916	2.75	2.50

ESSENTIAL OILS.

The conditions which obtained in the essential oil market showed but slight improvement compared with the preceding year, especially in regard to the imported oils. Production of synthetic oils in this country, however, was augmented, resulting in easier prices for these items. Oils of German, Austrian, Hungarian and Bulgarian origin were almost unobtainable, and new high record prices were established. The Messina essences wer irregular, bergamot and Italian orange oils advancing sharply, while lemon oil showed but little change throughout the year.

A shortage in labor at producing centers as well as abnormally high transportation charges, caused prices of natural essences to hold firm, even where crops of basic materials were almost normal. Another factor was the shortage in copper containers, as a result of the war. Heretofore a large percentage of the oil shipped to this country was packed in copper containers, but in many instances this was no longer possible.

Bergamot oil was offered in this market at $3.30 per pound in January, but with shipments delayed on account of the freight situation and with prices firmer abroad, the market soon commenced to move upward. In September the price advanced to $5.25 per pound, and towards the close $6 per pound was an inside price. Sweet Italian orange oil opened the year around $1.85, but late in December nothing under $3 was obtainable. Lemon oil sold from 90c. to $1.05 per pound, which compares with 95c. to $1.25 in 1915.

Oil of juniper berries, rectified, a German product made from the Austrian berries, was scarce, and the price advanced sharply from a nominal basis of $3.75 per pound to the almost prohibitive figure of $15 per pound. Bitter almond oil, another German product, advanced from $9 per pound to $13 per pound. Artificial almond oil sold from $5.50 to $6.50 per pound, as against $1 to $5.50 in 1915.

Citronella oil was higher, due chiefly to the uplift in freight and insurance charges. Ceylon citronella oil, in drums, ranged in price from 42c. to 46c. per pound. Peppermint oil was firmer, due to the smaller crop, average prices ranging fom $1.80 to $2.30 per pound, as against $1.35 to $2 in 1915. The same conditions affected the market for spearmint oil, prices being on an average of 20c. per pound higher than in the previous year. Sandalwood oil was in scanty supply, and prices advanced from $6.50 per pound to $10.50 per pound.

Natural wintergreen oil was unsettled, due to the sharp drop in prices for the synthetic material. Synthetic wintergreen oil opened the year at $3.50 per pound, nominal, with offerings scanty. As the output of domestic manufacturers was increased the market weakened, closing the year at $1.20 per pound, with the tone barely steady.

ALMOND.

Below are set forth the high and low prices for almond oil in each month of 1916:—

	Per pound— Bitter. High.	Low.	Artificial. High.	Low.
January	$9.25	$9.25	$5.50	$5.50
February	11.00	9.25	5.50	5.50
March	12.00	11.00	6.50	5.50
April	12.00	12.00	6.50	6.50
May	12.00	12.00	6.50	6.50
June	12.00	12.00	6.50	6.50
July	12.00	12.00	6.50	6.50
August	12.00	12.00	6.50	6.50
September	13.00	12.00	6.50	6.50
October	13.00	13.00	6.50	5.50
November	13.00	13.00	5.50	5.50
December	12.50	12.00	5.50	5.50
Year	13.00	9.25	6.50	5.50

BERGAMOT.

A monthly summary of high and low prices for bergamot oil during the last year follows:—

	Per pound— 1916— High.	Low.
January	$3.50	$3.40
February	3.40	3.40
March	3.35	3.30
April	3.75	3.60
May	3.75	3.75
June	3.80	3.70
July	3.90	3.70
August	5.50	4.25
September	5.50	5.50
October	5.50	5.25
November	5.50	5.25
December	6.00	6.00
Year	6.00	3.30

LEMON.

A summary of high and low quotations for lemon oil for each month during the last year follows:—

	Per pound— 1916— High.	Low.
January	$1.00	$1.00
February	1.00	1.00
March	1.00	.95
April	.95	.95
May	.95	.95
June	.95	.95
July	.95	.90
August	.90	.90
September	1.00	.90
October	1.00	1.00
November	1.00	1.00
December	1.05	1.05
Year	1.05	.90

A record of high and low prices by years from 1901 to 1916 follows:—

	High.	Low.		High.	Low.
1901	$1.15	$0.80	1909	$3.00	$0.72½
1902	.80	.65	1910	.82½	.75
1903	.70	.55	1911	1.65	.80
1904	.55	.50	1912	2.10	1.30
1905	.57½	.55	1913	4.75	2.20
1906	1.20	.57	1914	3.75	1.05
1907	2.00	1.00	1915	1.25	.95
1908	1.50	.70	1916	1.05	.90

ORANGE.

Below are set forth the high and low prices for sweet orange oil in each month of 1916:—

	Per pound— Italian. High.	Low.	West Indian. High.	Low.
January	$1.90	$1.85	$1.50	$1.50
February	1.85	1.85	1.50	1.50
March	1.90	1.85	1.50	1.50
April	2.60	1.90	2.00	1.50
May	2.85	2.75	2.65	2.50
June	2.85	2.85	2.65	2.50
July	2.85	2.75	2.50	2.50
August	3.00	2.75	2.75	2.50
September	3.00	3.00	2.75	2.75
October	3.00	3.00	2.75	2.50
November	3.00	3.00	2.50	2.50
December	3.00	2.85	2.50	2.25
Year	3.00	1.85	2.75	1.50

PEPPERMINT.

High and low prices for bulk peppermint oil for the last year are summarized as follows:—

	Per pound— 1916— High.	Low.
January	$1.95	$1.95
February	1.95	1.95
March	1.95	1.95
April	1.95	1.90
May	1.90	1.80
June	1.80	1.80
July	1.80	1.80
August	1.90	1.90
September	2.30	2.20
October	2.30	2.20
November	2.15	2.10
December	2.15	2.10
Year	2.30	1.80

A record of the high and low prices for the years 1911 to 1916, inclusive, follows:—

	High.	Low.		High.	Low.
1911	$2.90	$2.25	1914	$4.60	$1.40
1912	2.85	2.75	1915	2.00	1.35
1913	3.85	2.75	1916	2.30	1.80

SPEARMINT.

A summary of high and low prices for spearmint oil during the last year follows:—

	Per pound— 1916— High.	Low.
January	$1.75	$1.75
February	1.75	1.75
March	1.75	1.50
April	1.50	1.50
May	1.50	1.50
June	1.50	1.50
July	1.90	1.50
August	1.60	1.50
September	1.90	1.65
October	1.90	1.90
November	1.90	1.90
December	1.90	1.90
Year	1.90	1.50

A record of the high and low prices for last four years follows:—

	High.	Low.		High.	Low.
1913	$4.85	$4.00	1915	$1.75	$1.35
1914	4.00	1.50	1916	1.90	1.50

FLOWERS.

Prices for American saffron flowers were the highest on record, due to the shrinkage in shipments from producing sections. American saffron sold from $1.20 to $2 per pound over the first ten months of the year. New crop offerings in November and December weakened the market, bringing about a general revision in prices to 75c. to 80c. per pound. Spanish saffron ranged in price from $10.35 to $11.40 per pound, which compares with $10.50 to $12 per pound in 1915. Arnica flowers were scarce, advancing from a nominal basis of 34@35c. per pound, to $1.10 @1.20 per pound. Hungarian chamomile flowers were virtually unobtainable, and prices were entirely nominal. Lavender flowers, ordinary quality, were traded in over the year at prices ranging from 16c. to 20c.

SAFFRON, AMERICAN.

The following table shows the fluctuations in prices for American saffron flowers in 1916:—

	Per pound— 1916— High.	Low.
January	$1.25	$1.25
February	1.35	1.25
March	1.35	1.35
April	2.00	1.35
May	1.80	1.75
June	1.75	1.75
July	1.75	1.75
August	1.75	1.70
September	1.70	1.65
October	1.40	1.10
November	1.00	.90
December	.85	.75
Year	2.00	.75

A record of high and low prices for the last six years follows:—

	Cents per pound— High.	Low.		High.	Low.
1910	55	18	1914	60	35
1911	33	18	1915	1.25	32
1912	45	33	1916	2.00	75
1913	45	30			

SAFFRON FLOWERS, SPANISH.

	Per pound— High.	Low.
January	$11.15	$11.15
February	11.15	11.15
March	11.00	11.00
April	10.75	10.75
May	10.75	10.75
June	10.75	10.70
July	10.75	10.70
August	10.75	10.35
September	11.00	10.35
October	11.00	11.00
November	11.40	11.00
December	11.40	11.40
Year	11.40	10.35

GUMS.

Consumption of gum camphor in the United States during 1916 made enormous strides, due chiefly to the development of the celluloid industry. Importations showed an increase of approximately 50 per cent. Latest figures available place the imports of crude and refined camphor into the United States for the eleven months ending with November at 8,289,710 pounds, as against a total of 4,068,206 pounds during the corresponding period a year ago, and 4,147,004 pounds for the same time in 1914. The output of celluloid, artificial ivory and isinglass was increased enormously, and with the explosive makers also heavy buyers the situation was strong, notwithstanding the heavy importations. Advances in the price of crude by the Japanese monopoly and high freights brought out sharp advances in the market for refined. According to advices from Japan producers experienced much trouble in supplying the heavy demands as sources of production were not so accessible, owing to the fact that the gathering of the gum on the Island of Formosa now extends well into the interior. American refiners in January offered refined camphor in bulk at 42c. per pound. The price was advanced to 52c. by April, 69½c. in September, 80½c. in October and closed the year at 86½c. Japanese refined camphor fluctuated sharply, the market following the domestic closely throughout the year. Toward the close, however, the offerings of Japanese refined were scanty and it was doubtful whether any round lots were available on the spot at 87@88c. per pound, the price being from ½c. to 1½c. higher than that quoted by domestic refiners.

Tragacanth was in scanty supply, owing to the war conditions, which brought about a cessation of shipments from important producing sections like Turkey, and prices ruled high. On Aleppy firsts market prices ranged from $2 to $2.85 per pound, the high figure obtaining in April. Toward the close of the year nominal prices on firsts ranged from $2.15 to $2.25 per pound. Aloes, Curacao, in cases, sold during the year at 9@14c. per pound, as against 11½@15c. in 1915. Gum Arabic was in light supply and prices were well maintained, amber sorts selling from 15c. to 25c. per pound, which compares with 11½@23c. in 1915.

ALOES, CURACAO.

The following shows the prevailing high and low prices for Curacao aloes in cases in each month during the last year:—

CURACAO ALOES, IN CASES AND GOURDS.

	Cents per pound— Cases. H.	L.	Gourds. H.	L.
January	14	14	30	15
February	14	14	30	30
March	14	14	30	25
April	12½	11½	27	27
May	11½	11½	27	27
June	10¾	10	27	27
July	10	9	27	22
August	9	9	24	20
September	9	9	24	20
October	11	9	25	25
November	10	9	25	25
December	9	9	25	20
Year	14	9	30	15

A summary of the high and low prices for Curacao aloes in cases in the last seven years follows:—

	Cents per pound— High.	Low.
1910	8¾	6¾
1911	8	6½
1912	11½	7¾
1913	11	6½
1914	16	8
1915	14	11¼
1916	14	9

ARABIC.

In the following table the high and low prices for amber sorts of gum arabic are given for each month of 1916:—

	Cents per pound— High.	Low.
January	24	23
February	25	24
March	25	25
April	25	25
May	23	21
June	19	18
July	17	15
August	15	15
September	15	15
October	16	15
November	17	16
December	17	16
Year	25	15

CAMPHOR.

American, Refined.

High and low prices for American refined camphor in bulk, by months, for 1916 are shown in the following summary:—

	Cents per pound, bulk, in barrels. High.	Low
January	42	42
February	44	44
March	46	44
April	52	52
May	52	52
June	52	52

NITRATE of SODA

POTASH

CAUSTIC
MURIATE
SULPHATE
NITRATE
CHLORATE
BICHROMATE

SODA

CAUSTIC
ASH
SULPHIDE
PRUSSIATE
CHLORATE
ACETATE

ACIDS

SULPHURIC
NITRIC
MURIATIC
ACETIC
OXALIC
CARBOLIC

ALUMS

CHROME
AMMONIA
POTASH
SULPHATE OF ALUMINA

EUGENE SUTER

80 MAIDEN LANE Phones John 5076-7-8 NEW YORK, N.Y.

	High.	Low.
July	55	52
August	60	55
September	69½	62½
October	80½	69½
November	80½	80½
December	86½	80½
Year	86½	42

A record of the high and low prices for the six previous years follows:—

	High.	Low.
1910	45	42
1911	49½	42
1912	44	44
1913	44	42
1914	59½	41
1915	44½	41

Japan Refined Camphor, 2 1-2-lb. Slabs.

	Cents per pound—High.	Low.
January	42½	42
February	43	42
March	46	43
April	53	52
May	53	52
June	53	50
July	53	52
August	63	57
September	80	63
October	82	74½
November	82½	82½
December	88	85
Year	88	42

TRAGACANTH.

The following tables show the high and low prices in each month of 1916 for the first, second and third qualities and sorts of Aleppo gum, and also for the first, second and third qualities of Turkish gum:—

	Dollars per pound—Firsts. H.	Firsts. L.	Seconds. H.	Seconds. L.	Thirds. H.	Thirds. L.	Sorts. H.	Sorts. L.
Jan.	2.15	2.00	1.80	1.80	1.00	1.00	0.50	0.50
Feb.	2.50	2.50	2.00	2.00	1.25	1.25	.50	.50
March.	2.60	2.60	2.20	2.20	1.35	1.35	.50	.50
April.	2.85	2.75	2.35	2.25	1.40	1.40	.50	.50
May.	2.85	2.85	2.35	2.35	1.40	1.40	.50	.50
June.	2.75	2.65	2.35	2.35	1.40	1.40	.50	.50
July.	2.40	2.40	2.20	2.20	1.40	1.40	.50	.50
Aug.	2.40	2.10	2.20	2.20	1.40	1.40	.50	.50
Sept.	2.20	2.10	2.00	2.00	1.40	1.40	.50	.50
Oct.	2.23	2.20	2.00	2.00	1.40	1.40	.50	.50
Nov.	2.25	2.10	2.00	2.00	1.40	1.40	.50	.50
Dec.	2.15	2.15	2.00	2.00	1.90	1.90	.75	.75
Year.	2.85	2.00	2.35	1.80	1.90	1.00	.75	.50

Turkish.

	Per pound—Firsts. H.	Firsts. L.	Seconds. H.	Seconds. L.	Thirds. H.	Thirds. L.
January	$1.75	$1.75	$1.20	$1.20	$0.80	$0.80
February	1.75	1.75	1.20	1.20	.80	.80
March	2.75	2.75	2.25	2.25	2.00	2.00
April	2.75	2.75	2.25	2.25	2.00	2.00
May	2.75	2.75	2.25	2.25	2.00	2.00
June	2.75	2.75	2.25	2.25	2.00	2.00
July	2.75	2.75	2.25	2.25	2.00	2.00
August	2.75	2.75	2.25	2.25	2.00	2.00
September	2.75	2.75	2.25	2.25	2.00	2.00
October	2.75	2.75	2.25	2.25	2.00	2.00
November	2.75	2.75	2.25	2.25	2.00	2.00
December	2.75	2.75	2.23	2.25	2.00	2.00
Year	2.75	1.75	2.25	1.20	2.00	.80

HERBS AND LEAVES.

Despite the rise in freights and the delay in shipments the market for buchu leaves held on a fairly even basis throughout the year. Short buchu leaves ranged in price from $1.15 to $1.30 per pound, which compares with $1.05@1.55 per pound during 1915. Damiana leaves were in scanty supply and prices advanced from 6½c. to 13c. per pound. Belladonna also was firm, selling from $1.35 to $1.85 per pound, as against 75c. to $1.50 in 1915. Due to the unfavorable shipping facilities Russian henbane was in scanty supply and closed the year around $3.25 per pound. Imported sage and marjoram were high through the inability to replace the German and Austrian goods. Digitalis was offered more freely toward the close, bringing about a reduction in the price from the high of 80c. per pound to 40c. per pound. Alexandria whole senna was firmly maintained, owing to the scarcity of offerings from primary markets, quotations in the local market ranging from 45c. to 75c. per pound during the year.

BUCHU.

High and low prices for short buchu leaves for the last year are set forth as follows:—

BUCHU SHORT AND LONG.

	Per pound—Short. H.	Short. L.	Long. H.	Long. L.
January	$1.30	$1.30	$1.30	$1.30
February	1.30	1.30	1.30	1.30
March	1.30	1.30	1.30	1.30
April	1.30	1.25	1.30	1.30
May	1.25	1.25	1.30	1.30
June	1.22½	1.18	1.30	1.30
July	1.20	1.20	1.30	1.30
August	1.20	1.20	1.85	1.30
September	1.20	1.15	1.25	1.25
October	1.20	1.20	1.25	1.25
November	1.20	1.20	1.25	1.25
December	1.20	1.15	1.25	1.20
Year	1.30	1.15	1.35	1.20

A summary of the high and low prices for the short leaves in the last four years follows:—

	High.	Low.
1912	$1.65	$0.95
1913	1.50	1.25
1914	1.85	1.30
1915	1.35	1.05

BELLADONNA LEAVES.

The following table shows the high and low prices in each month of 1916 for belladonna leaves:—

	Per pound—High.	Low.
January	$1.35	$1.35
February	1.35	1.35
March	1.85	1.50
April	1.85	1.75
May	1.85	1.85
June	1.85	1.85
July	1.85	1.75
August	1.60	1.50
September	1.40	1.40
October	1.50	1.50
November	1.50	1.50
December	1.50	1.50
Year	1.85	1.35

ROOTS.

Golden seal root ruled high, despite the reports of increased production in this country, which did not materialize. Prices for golden seal ranged from $4.25 to $5.50 per pound, comparing with $4.20 to $4.85 during the preceding year. Cartagena ipecac was in scanty supply, but prices fluctuated within a narrow range, the low for the year being $2.55, while the high price was $2.65 per pound. The same condition obtained for Rio ipecac. Due to the cessation of imports, aconite advanced from 18c. to the nominal basis of 75c. per pound. Belladonna was in scant supply, and the market advanced from $2 to $3.50@5 per pound. Gentian was high in price over the first ten months, due to the shrinkage in supplies, but as new stock was offered here in December prices dropped from the high of 27c. to 13c. per pound. Mexican sarsaparilla was quoted over the year from 10½@14c. per pound, with the undertone steady in view of the Mexican political situation. Price changes in jalop were confined within narrow limits.

GOLDEN SEAL.

High and low prices for golden seal root in each month of 1916, together with those for the two years previous, are shown in the following summary:—

	Per pound—High.	Low.
January	$4.50	$4.50
February	4.50	4.50
March	4.50	4.50
April	4.50	4.50
May	4.30	4.30
June	4.40	4.40
July	4.75	4.40
August	5.50	5.00
September	5.50	5.50
October	5.35	5.35
November	5.35	5.10
December	5.00	4.25
Year	5.50	4.25

A record of the high and low prices for the four previous years follows:—

	High.	Low.
1912	$5.25	$4.00
1913	5.00	3.90
1914	4.90	4.20
1915	4.85	4.20

IPECAC.

The following table shows the high and low prices in each month of 1916 for Cartagena and Rio ipecac root:—

	Per pound—Cartagena. High.	Cartagena. Low.	Rio. High.	Rio. Low.
January	$3.25	$3.00	$4.00	$4.00
February	3.25	3.00	4.00	4.00
March	3.00	2.85	4.00	4.00
April	2.65	2.65	3.75	3.75
May	2.55	2.55	3.75	3.75
June	2.10	2.05	3.75	3.75
July	2.05	1.50	3.75	3.75
August	1.80	1.60	3.75	3.75
September	1.85	1.85	3.75	3.00
October	1.95	1.80	3.00	3.00
November	2.00	1.95	3.00	2.75
December	2.25	1.95	3.00	3.00
Year	2.65	2.55	4.00	3.00

CARTAGENA.

A summary of the high and low prices for Cartagena root for the last five years follows:—

	Per pound—High.	Low.
1911	$2.30	$1.75
1912	2.35	1.45
1913	2.20	1.75
1914	2.00	1.42½
1915	5.50	1.70

JALAP.

The following table shows high and low prices for jalap root for each month in 1916:—

	Cents per pound—High.	Low.
January	8¾	8¾
February	8¾	8¾
March	10	8¾
April	10	10
May	10	10
June	10	10
July	11½	11½
August	11½	11½
September	11½	10
October	10	10
November	10	10
December	12	10
Year	12	8¾

A record of high and low prices for the past five years follows:—

	Cents per pound—High.	Low.
1911	40	22
1912	20	22
1913	23	13
1914	20	10
1915	10	8

SARSAPARILLA.

Mexican.

The high and low quotations for Mexican or Tampico sarsaparilla root each month during the last year are shown in the following summary:—

	Cents per pound—High.	Low.
January	12	12
February	11	11
March	11	11
April	11	11
May	11	10½
June	13	10½
July	12½	12
August	12	10½
September	10½	10½
October	12½	10½
November	13	12½
December	14	12
Year	14	10½

A record of the high and low prices for the six previous years follows:—

	Cents per pound—High.	Low.
1910	11	8¾
1911	18½	9
1912	19	11
1913	28	14
1914	50	10
1915	15	9

SENEGA.

Northwestern.

High and low prices for senega root in

each month of 1916 are shown as follows:—

	Cents per pound—High.	Low.
January	45	45
February	45	45
March	45	45
April	45	44
May	45	43
June	41	40
July	42	42
August	54	42
September	60	60
October	65	62
November	65	65
December	68	65
Year	68	40

A record of high and low prices for the six years follows:—

	Cents per pound—High.	Low.
1910	60	43
1911	60	42
1912	65	59
1913	80	63
1914	50	38
1915	45	35

SEEDS.

Influenced by both smaller crops and the shipping situation, the market for seeds, generally speaking, was firm throughout the year. Trading was normal, despite the high prices. The year opened with a marked shortage in supplies of celery seed, and during the first quarter as high as 34c. was demanded for spot goods. As new goods were offered prices eased off, until toward the close of the year there were sellers around 18¼c. per pound. Caraway seed scored a sensational advance, due to the shrinkage in supplies, opening around 10¾c. per pound and closing at the almost prohibitive price of 51c. per pound. South American canary seed was offered during the year at 5½@5¾c. per pound, while Dutch variety was quoted at 4½@5¾c. per pound. Smyrna canary seed was scarce, owing to the war, and at the close the nominal price was established at 7½c. per pound. Flaxseed was high, due to the shortage in production. Dutch poppy seed advanced from 23c. to 38c. per pound.

CANARY.

Below are set forth the high and low prices for canary seed in each of the months of 1916:—

	Cents per pound—Smyrna. High.	Low.	South American. High.	Low.	Dutch. High.	Low.
Jan.	7	5¾	5¼	4¾	4¾	4½
Feb.	7	7	5½	5½	4¾	4¾
March	7	7	5½	5½	5¼	5¼
April	7	7	5¾	5¼	5¼	5¼
May	7	7	5	4¾	5¾	5¼
June	7	7	4¾	4½	5¼	5
July	7	7	4½	4½	5	4½
Aug.	7	7	4½	4½	4½	4½
Sept.	7	7	4¼	4	5	4½
Oct.	7	7	4¾	4¼	6	5
Nov.	7	7	4¾	4¾	5	5
Dec.	7½	7	5¾	5	5½	5
Year	7½	5¾	5½	4	5¾	4½

CARAWAY.

A summary of high and low prices for caraway seed in each month of 1916 is shown in the following table:—

	Cents per pound—High.	Low.
January	13½	12¾
February	14¼	14¼
March	15¾	10¾
April	21	16¼
May	21½	20½
June	19¾	19½
July	18¼	17¼
August	20	17¼
September	25½	24½
October	37½	31
November	48	42
December	51	[illegible]
Year	51	10¾

A record of the high and low prices for the previous five years follows:—

	Cents per pound—High.	Low.
1911	6½	5
1912	8	6⅝
1913	7¼	5¾
1914	15	7
1915	13½	8½

CELERY.

High and low quotations for celery seed in 1916 are shown by monthly comparisons as follows:—

CELERY SEED.		
January	30	29
February	29½	29
March	34	33
April	33	32½
May	30	29½
June	28	27
July	21	20
August	19	18½
September	25	23
October	21	20½
November	19½	18¾
December	18½	18¾
Year	34	18¾

A summary of the high and low prices for the previous four years:—

	Cents per pound—High.	Low.	Cents per pound—High.	Low.
1912	30	15		
1913	45	12		
1914	40	14		
1915	35	14		

SPICES.

The market for spices was highly irregular, due to the unusual conditions brought about by the war. The matter of freights was of vital importance throughout the year, bringing about abnormally high prices in many instances. Black Singapore pepper opened the year at 16c., nominal, but toward the close prices were firmly established at 21c. for spot goods. White Singapore pepper opened the year at 21c. and closed firm at 23c., nominal. Zanzibar cloves opened at 20c., nominal, owing to a shortage in supplies. In May there were sellers at 16½c., but subsequently the market advanced to 19c., at which price the market settled. Nutmegs were strong, the 105s advancing from 18½c. to 25c. per pound. Cassia prices moved within a narrow range, holding at 20@21c. per pound for Batavia No. 1.

CLOVES.

Zanzibar.

Following is a summary of the high and low points reached by Zanzibar cloves during each month of 1916:—

1916.	Cents per pound—High.	Low.
January	20	20
February	18½	18½
March	18	18
April	17¾	17¼
May	16½	16½
June	16½	16½
July	16⅝	16½
August	17½	16½
September	18	17½
October	17¾	17⅝
November	17¾	17⅝
December	19	17½
Year	20	16½

The highest and lowest prices for Zanzibar cloves for the last seventeen years:—

1916.	Cents per pound—High.	Low.
1916	20	16½
1915	21	15¼
1914	22	14½
1913	21½	15
1912	20⅜	10⅜
1911	19	12
1910	15½	10
1909	11½	9½
1908	12	10
1907	18½	11
1906	16	13
1905	14½	8½
1904	19	13
1903	10¼	7⅝
1902	9	8
1901	9½	7⅞

WAXES.

Interest centered in the paraffine situation. Export demand was heavy, and with prices for crude oil abnormally high, the tendency of the market was upward throughout the year. Imports of paraffine wax were resumed in 1916, but the total quantity received from foreign sources amounted to about 8,000,000 pounds. According to the latest customs statistics the exports of paraffine and paraffine wax from the United States for the eleven months ending with November amounted to 342,479,109 pounds, valued at $13,295,071, which compares with 357,914,357 pounds, valued at $11,544,478, in the corresponding period a year ago, and 164,795,263 pounds, valued at $5,533,012, in 1914. The price of domestic refined paraffine wax, 118@120 degrees melting point, advanced from 3¾c. per pound to 6½c. per pound, round lot basis. Quotations for foreign grades were wholly nominal throughout the interval.

Beeswax was in good demand and firm prices obtained in all quarters. A good export business was done. Production in this country was somewhat larger than in 1915. The market for crude yellow beeswax advanced from 28c. per pound to 34c. per pound. The crop of bayberry wax was approximately one-third of normal, owing to the unfavorable weather conditions which obtained during the flowering season. Prices held around 19½@22½c. per pound. Quotations for montan, ceresin and ozokerite were wholly nominal, due to the scanty stocks available as a result of the war. Carnauba wax closed higher, flor being quoted in December at 50c., comparing with 45c. a year ago.

Japan wax was affected by the freight situation and prices were on an average of 4c. higher than in 1915. Quotations in the local market ranged from 13c. to 18c. per pound, comparing with 10¼@13¾c. per pound during the preceding year.

CARNAUBA.

Below are set forth the high and low prices for the North Country No. 3 grade of carnauba wax in each month of 1916:—

	Cents per pound—No. 3 North Country High.	Low.
January	22	22
February	25	25
March	25	25
April	30	28
May	28½	28½
June	27	27
July	26½	26½
August	26½	26½
September	26½	26½
October	27	26½
November	28	27
December	29	28
Year	29	22

JAPAN.

The high and low prices for Japan wax by months during 1916 follow:—

	Cents per pound—High.	Low.
January	13	13
February	13½	13½
March	18	16
April	18	17
May	18	16½
June	17	16
July	15½	14
August	14	13½
September	14½	13¾
October	14¼	14¼
November	16	14¼
December	16½	16
Year	18	13

SHELLAC PRICES AT THE CLOSE OF 1916 WERE HIGHEST RECORDED SINCE 1907

The year in the shellac trade was marked by most unusual conditions and radical price changes, brought about chiefly by the war situation. Prices advanced sharply, closing the year at the highest point since 1907. The price of T. N. shellac in the local market, for spot delivery, ranged from 20c. to 39c. per pound, comparing with 13½@21c. for 1915. An embargo on shipments from the United Kingdom, the scarcity of freight room, and the increased consumption here were the governing factors. Early in the year it appeared as if the shipping situation might improve, but owing to the destruction of ocean tonnage and the requisitioning of many ships by the belligerent governments, a marked shortage in freights set in, particularly over the last quarter of the year, at which period prices took a sharp upward move.

Consumption of shellac in the United States has been making rapid headway, so that the usual supplies are no longer sufficient to meet the requirements. One industry alone, the making of phonograph discs, is now consuming enormous quantities of shellac. Total shipments of shellac from Calcutta for the shellac season of 1915-16, which dates from November to November, amounted to approximately 321,600 cwts., which compares with 335,400 cwts. for 1914-15, 338,000 cwts. for 1913-14, and 300,000 cwts. for 1912-13.

Shipments from Calcutta.

Shipments from Calcutta for the calendar year amounted to 301,800 cwts., which compares with 341,700 cwts. in 1915, and 327,800 cwts. in 1914, and 278,800 cwts. in 1913. The shipments to the United States for the calendar year amounted to 223,300 cwts., against 236,700 cwts. for 1915, and 163,900 cwts. in 1914.

The lowest price for T. N. shellac during the year obtained in January, when sellers did business on the spot at 20@21c. per pound. Prices were advanced steadily, so that before the close of the first quarter 24c. per pound was demanded. Shipments from Calcutta were moving slowly and the tendency of the market was upward throughout the spring and summer months. Towards the close of September T. N. shellac was quoted here at 32@33c. per pound. The embargo on shipments from England caused a further strengthening of prices, and in November the price was marked up to 38c. per pound. The year closed with offerings light, and 39c. was the inside trading basis for spot goods.

Fluctuations in the other grades were much in line with the market for T. N. Bone dry opened the year at 24½c., and closed at 48c. nominal. D. C. ranged in price over the year from 26c. to 46c. per pound, which compares with 19½c. to 28c. in 1915. Orange and button lac were scarce towards the close of the year, and prices were firmly maintained.

Shipments by Months, Two Years.

Shipments of shellac from Calcutta to America, by months, for the last two years, were as follows:—

	Cwts.—1916.	1915.
January	12,000	23,300
February	22,400	15,000
March	16,300	14,300
April	3,200	26,500
May	53,000	27,300
June	31,600	40,100
July	22,000	23,300
August	8,200	12,600
September	10,200	2,400
October	7,100	16,300
November	16,400	15,600
December	20,900	20,000
Totals	223,300	236,700

Shipments to Continent, Two Years.

Shipments of shellac from Calcutta to the Continent, by months, for the last two years, were as follows:—

	Cwts.—1916.	1915.
January	400	1,900
February	500	400
March	500	200
April	3,600	1,000
May	1,600	1,000
June	100	1,500
July	1,000	1,500
August	400	100
September	....	2,000
October	200	400
November	2,300	5,900
December	....	1,000
Totals	10,600	16,900

Shipments to United Kingdom.

Shipments of shellac from Calcutta to the United Kingdom, by months, for the past two years, were as follows:—

	Cwts.—1916.	1915.
January	6,400	9,900
February	9,300	8,400
March	17,900	7,600
April	15,200	3,200
May	9,200	6,700
June	4,100	10,700
July	1,900	4,700
August	....	7,000
September	100	6,600
October	1,600	10,400
November	1,900	6,800
December	300	6,100
Totals	67,900	88,100

Four Years' Shipments.

Total shipments, January-December, for the last four years:—

	1916. Cwts.	1915. Cwts.	1914. Cwts.	1913. Cwts.
Unit. Kingdom	67,900	88,100	89,600	83,200
Continent	10,600	16,900	74,300	65,300
America	223,300	236,700	163,900	130,300
Totals	301,800	341,700	327,800	278,800

Exports Calcutta, Four Seasons.

The record of exports of shellac from Calcutta for the last four shellac seasons follows:—

SHELLAC SEASON SHIPMENTS.

	November-November 1915-16. Cwts.	1914-15. Cwts.	1913-14. Cwts.	1912-13. Cwts.
America	230,700	250,400	162,700	140,300
Unit. Kingdom	74,400	92,300	94,100	77,800
Continent	16,500	12,700	81,200	81,900
Totals	321,600	335,400	338,000	300,000

Monthly Values of T. N.

A comparison of monthly values for T. N. during 1916 and of the high and low limits touched during the previous sixteen years is afforded by the following table, the basis being for bags, cases generally commanding a ½c. premium:—

T. N. IN BAGS.

	1916—High.	Low.
January	21	20
February	23	22½
March	23½	23
April	23½	23
May	24	24
June	25½	23½
July	29	26
August	32	30
September	33	32
October	31	31
November	38	34
December	39	39
Year	39	20

	High.	Low.
1915	21	13½
1914	21	14
1913	23½	16½
1912	16½	13½
1911	18	15½
1910	19½	14
1909	20½	14
1908	29	20
1907	48	26
1906	50	42
1905	46	42
1904	52	42
1903	52¾	26½
1902	40	24
1901	30	14
1900	15	14½

D. C. and V. S. O. Quotations.

The ranges of quotations for D. C. and V. S. O. shellac in the local market during the year follow:—

	D. C. High.	Low.	V. S. O. High.	Low.
January	26	26	26	25
February	29	29	29	28½
March	30	30	30	30
April	30	30	30	30
May	30	30	30	30
June	32	30	31	30
July	36	32	36	32
August	38	37	38	37
September	38	38	38	37
October	38	37½	38	37½
November	45	40	44½	39
December	46	46	45	45
Year	46	26	45	25

High and Low for Bleached.

The record of high and low prices for bleached shellac by months last year follows:—

BLEACHED.

	Bone dry. High.	Low.	Commercial. High.	Low.
January	26½	24½	22	19½
February	29	29	23½	23½
March	30	30	23½	23½
April	31	31	25	25
May	26	26	32	32
June	33	32	27	26
July	36	34	29	28
August	38	37	32	31
September	39	38	33	32
October	38	38	32	32
November	46	40	39	33
December	48	48	39½	39½
Year	48	24½	39½	23½

LONDON SHELLAC QUOTATIONS ADVANCED CONSISTENTLY FROM BEGINNING OF YEAR

Under the influence of smaller receipts and much reduced stocks shellac in 1916 almost consistently advanced, some 14s. being added to spot value of fair T. N. in the first half, but about 48s. in the second. The trade received a shock in September when the Ministry of Munitions announced that:—"In view of excessive price of shellac both in London and in Calcutta in consequence of speculation the government is considering what steps should be taken to put a stop to this inflation of price of a commodity which is required for military purposes."

On this there was a setback in quotations, but the government making no further definite sign, operators took courage and prices leapt up again undeterred by an occasional recrudescence of rumors of official intervention.

Landings, Deliveries and Stocks.

The landings, delivered and stocks, month by month, were as follows:—

	Cases—Landed. 1916.	1915.	Delivered. 1916.	1915.	Stocks. 1916.	1915.
Jan.	5,650	3,941	4,938	4,288	94,424	89,345
Feb.	2,111	8,166	13,566	2,618	82,910	94,893
March	4,653	6,161	4,394	3,967	83,160	97,087
April	5,425	6,224	4,440	3,423	84,145	99,898
May	8,571	1,319	7,155	5,063	85,561	96,154
June	1,737	4,443	7,941	3,776	85,357	96,821
July	7,718	3,365	8,661	5,510	80,414	94,676

Aug....	1,108	6,447	11,618	5,160	70,004	95,963
Sept...	955	5,343	6,353	4,874	64,606	96,432
Oct....	444	3,361	5,267	4,490	59,783	95,303
Nov....	1,084	6,306	4,106	4,508	56,761	97,101
Dec....	830	4,702	3,479	8,094	54,112	93,709
Tot...	42,286	59,778	81,818	55,761	.....	.....

Three-Year Comparisons.

The totals for 1916 compare with previous years thus:—

LANDED.

	Cases		
	1916.	1915.	1914.
Orange	31,873	48,407	34,837
Garnet	7,672	5,980	5,460
Button	2,741	5,394	6,073
Totals	42,286	50,778	46,370

DELIVERED.

	Cases		
	1916.	1915.	1914.
Orange	69,658	44,765	40,062
Garnet	6,593	5,712	4,716
Button	5,567	5,286	5,830
Totals	81,818	55,761	50,608

STOCKS AT END OF YEAR.

	Cases		
	1916.	1915.	1914.
Orange	47,508	85,642	81,901
Garnet	5,284	3,940	3,672
Button	1,320	4,227	4,119
Totals	54,112	93,709	89,692

Values, Week by Week, Four Years.

The course of values in 1916, week by week, was as follows, nearest dates in the three previous years being added for comparison:—

	1916.	1915.	1914.	1913.
	s. d.	s. d.	s. d.	s. d.
January 1.....	80 0	64 0	88 6	71 0
8.....	80 6	65 0	83 0	72 6
15.....	80 6	64 0	83 0	72 6
22.....	80 0	62 0	81 0	71 6
29.....	81 0	62 0	80 0	75 0
February 5.....	87 0	62 0	77 0	76 0
12.....	91 0	62 0	72 0	81 0
19.....	91 0	62 0	72 0	83 0
26.....	91 0	61 0	73 0	82 0
March 4.....	94 0	61 0	71 0	80 0
11.....	92 0	61 0	70 0	79 0
18.....	91 0	62 0	70 0	79 0
25.....	93 0	61 0	70 0	79 0
April 1.....	94 0	61 0	70 0	79 0
8.....	93 0	61 0	72 0	78 0
15.....	95 0	61 0	71 0	76 0
22.....	94 0	60 0	69 0	76 0
29.....	92 0	60 0	66 0	75 0
May 6.....	92 0	60 0	64 0	76 0
13.....	93 0	60 0	66 0	81 0
20.....	93 0	60 0	65 0	82 0
27.....	93 0	59 0	65 0	85 0
June 3.....	93 0	59 0	64 0	86 0
10.....	92 0	59 0	64 0	88 0
17.....	92 0	58 0	61 0	89 0
24.....	94 0	58 0	62 0	90 0
July 1.....	94 0	55 0	63 0	89 0
8.....	96 6	54 0	63 0	90 0
15.....	98 0	58 0	62 0	92 0
22.....	107 0	58 0	63 0	93 0
29.....	107 6	62 0	60 0	94 0
August 5.....	116 0	60 0	59 0	95 0
12.....	121 0	62 0	59 0	101 0
19.....	129 0	62 0	58 0	102 0
26.....	126 0	63 0	58 0	102 0
September 2...	130 0	67 0	55 0	102 0
9...	131 0	66 0	54 0	99 0
16...	132 0	69 0	65 0	99 0
23...	132 0	68 0	55 0	97 0
30...	122 0	69 0	55 0	91 0
October 7.....	120 0	69 0	55 0	90 0
14.....	119 0	69 0	55 0	90 0
21.....	119 0	68 0	55 0	90 0
28.....	121 0	72 0	57 0	92 0
November 4...	127 0	72 0	57 0	90 0
11...	137 0	72 0	60 0	89 0
18...	140 0	74 0	62 0	87 0
25...	141 0	76 0	61 0	87 0
December 2...	138 0	75 0	60 0	82 0
9...	141 0	79 0	62 0	82 0
16...	141 0	80 0	63 0	85 0
23...	142 0	79 0	62 0	85 0
30...	142 0	80 0	64 0	88 0

Weekly Spot Prices.

The weekly spot prices cabled to the Reporter show the following variations:—

	Open.	Close.	High.	Low.
	s. d.	s. d.	s. d.	s. d.
1916.....	80 0	142 0	142 0	80 0
1915.....	64 0	79 0	80 0	54 0
1914.....	88 6	62 0	88 6	54 0
1913.....	71 0	85 0	102 0	71 0
1912.....	63 0	70 0	71 0	61 0
1911.....	77 0	63 0	80 0	62 0
1910.....	88 0	77 0	88 0	65 0

Monthly Quotations for Futures.

Monthly quotations for futures over the last two years show as follows:—

Date.	1916 Price, s. d.	Delivery.
January 1.....	82 0	March
February 5.....	87 6	March
March 4.....	95 6	May
April 1.....	95 6	May
May 6.....	94 6	August
June 3.....	93 0	August
July 1.....	96 0	October
August 5.....	120 0	October
September 2.....	130 0	December
October 1.....	120 6	December
November 4.....	127 0	December
December 2.....	142 6	March
December 31.....	146 0	March

Date.	1915 Price, s. d.	Delivery.
January 2.....	65 0	March
February 6.....	62 6	March
March 6.....	62 0	May
April 3.....	62 0	May
May 8.....	62 0	August
June 5.....	61 0	August
July 3.....	55 0	August
August 7.....	64 0	December
September 4.....	60* 0	December
October 2.....	71 0	December
November 6.....	73 0	December
December 4.....	78 0	March
December 31.....	82 0	March

American Botanical Drugs.

Mandrake Root.

Last season opened with an enormous stock of mandrake root carried over from the previous season. Although the 1916 dig was very light, yet the curtailed demand from Europe caused a lessened demand for export. The American consumption, however, was about normal. The amount of stock in the hands of dealers on January 1, 1917, is estimated at about half of that which was carried over from January 1, 1916.

Golden Seal Root.

This very important item, opened in producing centers at the beginning of the season, May and June, at $4.25 to $4.30. A heavy export demand set in about August and continued to the end of September, and prices advanced rapidly to $5@5.15. The usual happened. The small dealers were heavily loaded and the cultivators, some whom had been in the business for several years, but had never dug their crop, all began digging and soon thousands of pounds were poured into the market and with the diminished demand from Europe, the price declined almost as rapidly as it had advanced several months previous. It is safe to say there will be a large amount carried over into 1917, and with conditions in war-stricken Europe looking worse, it is safe to predict the 1917 crop will be purchased for much less money. It is difficult to estimate how much is held by speculators, but from reliable sources we learn that the amount is large.

Slippery Elm Bark.

Like mandrake this commodity was very dull all season, there being hundreds of tons carried over from 1914 and 1915. The 1916 peel was not at all heavy, yet with the curtailed demand a large amount is in the hands of dealers, although diminished by at least 50 per cent.

Helonias and Aletris.

These drugs were on the continual down grade the entire season and followed the usual custom of one extreme and then the other. The extraordinary high prices paid in the winter of 1914-15 caused an enormous crop and prices have been declining since the beginning of 1916. The year 1917 opens with a fair-sized amount held in all sections of the United States.

Culver's Root.

What was said of mandrake and slippery elm pertains to culver's root also. The dig in 1916 was extremely light, but there was an immense amount carried over, and were it not for the curtailed European demand the market would be bare and the price much higher. However, there will be a large carry over, although stocks in the hands of consumers have diminished fully 50 per cent. during 1916.

Wahoo Bark.

Since the war began has been neglected. The demand has been extremely light during the whole year, while the dig was correspondingly light. There is ample stock in the hands of dealers with little prospect of an immediate advance.

Burdock, Yellow Dock, Stramonium and Calamus.

These drugs, in the parlance of Wall street, "war babies" have all advanced. They were affected differently, the supplies coming mostly from Europe. The prices in the past were too low to interest the American root digger.

Western Report for Oil Peppermint, 1916.

It will be impossible to give anything like a correct idea as to the right estimate about peppermint acreage, the future trend of prices, etc. The extreme weather conditions of the season 1916 upset all calculations. January of 1916 saw prices in the West at about $1.85 per pound. As spring approached prices weakened to some extent until the time the new crop was ready to harvest peppermint was down to about $1.40 per pound, with a quantity of oil held over, the amount not known.

The spring of 1916 opened fairly favorable and considerable planting was done. About the time planting was half over some very rainy weather came, which lasted until about the last of June. This rainy weather caused many roots which were supposed to have wintered well to weaken; then the weather changed and a severe drought set in. This finished the roots in the weak places and caused the fields to be spotted so that, though the acreage was increased by the spring planting, it is doubtful if as much real peppermint was harvested in 1916 as in 1915.

The lack of potas halso partially was responsible for the weakened condition of the plants and the small leaves which were developed on same. It is usually believed that the crop yield of 1916 was about the same as 1915. Growers have been very persistent in holding back their oil, particularly since their first sales were made, and it remains with them to determine whether prices will continue at their present level or make an advance.

BRITISH DRUG MARKET HAMPERED BY RESTRICTIONS, YEAR WAS PROSPEROUS

Looking back on 1916 it must be acknowledged that despite considerable official restraints on home and export trade—particularly the latter—and notwithsanding higher cost of labor, package and transport, the volume of business passed through London and provincial houses has been very fair indeed and the profit thereon good. Orders from abroad, although curtailed from some markets, have shown marked expansion from others, notably from the ccuntries allied with Britain in the war, particularly Russia. Home demand has been restricted to immediate requirement, which factor, however, has been considerably augmented by war's requirements.

Restrictions on the sale and possession of cocaine and opium (enforced mainly to protect soldiers and sailors) and on glycerine (to conserve supplies for munitions of war) have been loyally acted on by the trade. On the production side the dearer cost of alcohol has been recharged in the innumerable preparations into which it enters, and it may also be recorded that there have been significant developments in the production of synthetic chemicals imported from Germany before the war, especially in the salicylates, vanillin, thymol and some of the aromatic or perfumery chemicals.

In the following tables are surveyed the course of prices of the more important items of the drug and fine chemical group:—

	Open.	Close.	High.	Low.
	s. d.	s. d.	s. d.	s. d.
Acetanilide, lb.....	7 0	2 9	9 0	2 8
Acetosalicylic acid lb.	47 6	20 0	48 6	20 0
Almond oil, sweet, lb.	2 9	2 6	2 9	2 6
Aloes, Cape, good, cwt.	37 6	41 0	45 0	37 6
Atropine sulph..oz.	120 0	115 0	165 0	115 0
Balsam, copaiba, lb.	1 11	3 4	3 6	1 11
Peru, lb.....	21 0	15 6	21 0	14 3
Tolu, lb.....	1 7	1 7½	1 9	1 6
Barbitone, lb.....	52 6	95 0	100 0	52 6
Bismuth subnit., 1 cwt. lots, lb..	10 0½	11 0½	15 0	10 0½
Buchu, fair round, lb.	5 3	5 6	5 6	5 3
Calomel, 1 cwt. lots (makers), lb.....	6 1½	6 5½	6 5½	6 1½
Camphor, crude Japan, c.i.f.,cwt—				
B 135	0	164 6	164 6	135 6
BB 147	6	174 6	174 6	147 6
Refined, Japan, 1-oz. slabs, lb.	1 9	3 3	3 3	1 9
Japan, 2½-oz. slabs, lb.....	1 8	3 4	3 4	1 8
English bells,lb.	2 3	2 11	2 11	2 3
Cantharides, Russian, lb.....	11 6	16 0	16 6	11 6
Cascara sagrada, as to age, cwt.....	55 0	70 0	70 0	55 0
Chloral hydrate, duty paid, lb....	14 9	9 6	14 9	9 6
Caffeine, pure, lb..	25 0	55 0	55 0	25 0
Cocoa butter, duty paid, lb.....	2 1	1 6	2 6	1 6
Cocaine hydrochlor., oz.....	14 0	21 0	27 6	14 0
Codliver oil, Norweg., c.i.f., bar.	335 0	550 0	845 0	335 0
Codeine, pure cryst., oz.	22 0	21 0	22 0	21 0
Ergot of rye, Russian, lb.....	2 3	1 10	2 6	1 6
Formaldehyde, 40 vols., cwt.....	56 0	75 0	125 0	56 0
Gentian root, cwt..	55 0	70 0	80 0	55 0
Guaiacol carbonate, lb.	75 0	107 0	150 0	75 0
Hexamine, lb.....	5 0	2 9	5 0	2 6
Hydroquinone, lb..	35 0	15 0	45 0	13 0
Ipecac, fair Rio, lb	24 0	9 6	24 0	9 6
fair Cartagena,lb	16 0	8 6	16 0	7 0
Menthol, Kobayashi, lb.	12 0	14 0	14 0	10 6
Milk, sugar, cwt..	72 6	175 0	180 0	72 6
Morphine, hydrochlor., oz.....	13 3	14 0	14 0	13 3
Opium, Persian, 10 per cent., lb...	25 0	33 0	33 0	24 0
Turkey, 11 per cent., lb.....	35 0	38 6	38 6	32 0
Orange peel, fair Tripoli, lb.....	1 6	1 10	2 6	1 6
Paraldehyde, lb...	15 6	10 6	15 0	9 6
Phenacetine, lb....	60 0	95 0	115 0	60 0
Phenazone, lb.....	72 6	33 0	77 6	35 0
Phenolphthalein, lb	37 6	85 0	....	37 6
Pilocarpine, hydrochlor., oz	17 0	24 0	25 0	17 0
Potassium bromide, lb.	25 0	7 0	25 0	6 0
Quinine sulphate, oz.	3 3	2 6	4 3	2 2
Resorcin, lb.....	70 0	145 0	145 0	70 0
Saccharin, 550 lbs.	82 6	200 0	200 0	82 6
Salicylic acid, lb...	20 0	5 9	22 0	5 9
Salol, lb.....	46 0	11 0	48 0	11 0
Santonin, lb.....155	0	160 0	160 0	155 0
Sarsaparilla, fair gray Jamaica, lb.	1 8	1 10	1 10	1 8
Senega, cwt.....	2 1	3 3	3 4	2 1
Senna, fair Tinnevelly, lb.....	0 10½	0 6½	1 0	0 5½
Soda, salicylate, lb	21 0	6 0	21 0	6 0
Strychnine, pure,oz	2 6	3 4	3 4	2 6
Sulphonal, lb.....	45 0	30 0	45 0	27 0
Theobromine, pure, lb.	55 0	70 0	70 0	55 0
Wax, good Jamaica, cwt.....155	0	170 0	170 0	150 0

Synthetic Group of Most Interest.

Of the above articles those coming in the synthetic group have provided most interest. In 1915 the absence of German supplies was reflected in violent uplifts in values for spot goods in London; in 1916, however, we have seen several recessions from the high levels thus established, particularly in the salicylates, hexamine and suphonal, as a result of larger production both here and in the United States and in acetanilde and hydroquinone, owing to more plentiful supplies of raw material. Against these declines has to be set the very high scores of phenacentine, guaiacol carbonate, barbitone phenolphthaleln and resorcin, resulting primarily from scarcity and accentuated by dealers holding out for very full profits.

The Alkaloids.

As regards the alkaloids English makers have not sought excessive profits and have refrained from pandering to the cupidity of the outside operator by supplying, as a rule, their regular customers only. Speculators, however, found a small opening in morphine toward the close of the year, when their price went up to 14s., the factories being full up with orders, and importers of caffeine were able to secure satisfactory profits. Second hand operations in continental quinine sulphate have traveled from 4s. 3d. to 2s. 2d., the article being cheaper on the year, consumers not having lent much encouragement to any manipulation.

Of the crude drugs it will suffice to speak of a few not mentioned in the table. Belladonna root and leaves have fetched extreme prices, owing to the great scarcity; the root at writing is 6s. 6d. per pound. Cardamoms have declined through the absence of Central European demand, but the sales have been so irregular as not to permit of close comparison. Colchicum root and seed are now 5s. 6d. and up per pound, respectively. Insect flowers, Japan, have attained 135s.@145s. per pound.

Hard Pressed to Meet Demand.

For the rest it is only necessary to say that English factories have found their work fully cut out to meet demand for bismuth salts and mercurials; the advances in Japan crude camphor naturally reacted on the prices for refined; quotations from Norway for medicinal codliver oil have practically been prohibitive of business, which has been mainly confined to dealings for old oil on spot at 325s. and 400s. per barrel and to purchases of the non-freezing Newfoundland oil, lately on the basis of 13s. 6d. per gallon; the decline in bromides was, of course, accentuated by the sensational drop indicated from your side; milk-sugar has been very scarce, and saccharin, likewise, the makers advancing the 550 grade to 130s. per pound to regular customers only and second hands getting as much as 200s. for small parcels on hand.

British Glycerine Market Marked by Supply Stringency.

Consumers of glycerine in 1916 found themselves at first laboring under increasing stringency in supply and ultimately for many of the largest users there was no supply at all. The government requirements continued to expand until the needs of toilet manufacturers were entirely cut off and the article was one sold by makers and wholesale druggists on an undertaking by the purchaser that it would solely be used for making preparations of the British Pharmaceutical Code and for dispensing doctors' prescriptions. Special license had to be obtained from the Ministry of Munitions for the glycerine needed for any other medicinal articles. At first there was some doubt whether these regulations applied to glycerine stocked prior to the official order, but the government requested that it should be regarded as applicable thereto and distributors and users were put on their honor in the matter, most of them loyally co-operating at once in the conservation of an article of prime national importance.

One effect of the war has been to make glycerin the main product of the soap-maker, soap becoming the by-product—a reversal of the normal position. Importation of toilet preparations containing glycerine was as a matter of equity stopped as a general rule.

Another important effect of government control of glycerin has been that the recoverable glycerin contents of all vegetable seeds and oils exported from this country to the United States of America have to be returned to the United Kingdom—the percentage to be returned varying from 3 to 12, according to the seed or oil.

The government prices for the purchase of all the glycerin made in the United Kingdom have not varied from those reported in the last annual review number and the official price for C. P. has remained unaltered at 110s. per cwt. for five-ton lots naked in drums; any occasional second hand parcels have of course commanded a premium. Crude naked was nominally quoted at £65@70 per ton f. o. b. in the first quarter of the year, but since then has been unobtainable.

Glycerine Prices Fluctuate Widely in French Markets.

Paris, Dec. 2, 1915.

The year closed quiet but firm after the excitement which prevailed during the last four months, especially in saponification glycerine. The price of saponification glycerine has undergone a depression of 100 francs per 100 kilos, compared with the highest prices in 1915, while soaplye glycerine, which never crossed 160 francs in 1915, reached 162.50 francs in February, 1916, and declined in November to 100 francs.

During January, 1916, the demand decreased considerably for the saponification glycerine and the price declined rapidly to 175 francs per 100 kilos, loose, 3½ per cent. discount for cash. Business was very restricted at this period, so far as soaplye was concerned, and several transactions were reported from 155 to 157.50 francs.

In February the market was firmer, saponification being quoted from 180 to 185 francs per 100 kilos, loose. Soaplye also was more active, the market advancing to 162.50 francs per 100 kilos. In March the price for saponification during the first two weeks went up to 210 francs, but in the second half of the month the demand subsided and buyers at 190 to 195 francs were scarce. Soaplye glycerine, which was in demand the first half of the month at 162.50 francs, deakened in the second half, and several important sales for deliveries over the following four months were made at 152.50 francs.

In April the demand continued to relax, but prices for saponification were well maintained at 190 to 195 francs, while soaplye declined to 145 francs under insignificant sales. In May buyers were generally holding back, and under the quiet trading saponification was offered at 170 francs, with the soaplye at 135 to 140 francs, but without success. In June several sales of saponification were made between 170 and 180 francs, net cash, the discount of 3½ per cent. being discontinued at this time. Soaplye glycerine was irregular and transactions were reported at prices ranging from 120 to 140 francs.

In July several lots of saponification glycerine were traded in at 162.50 to 165 francs, net cash, and soaplye was traded in at 125 francs. In August the situation was not much changed, saponification comamnding from 165 to 170 francs, net, and soaplye from 120 to 125 francs, the low price obtaining toward the close of the month. In September dullness continued and saponification was obtainable from 165 to 167.50 francs, net cash. Soaplye glycerine found no buyers at the beginning of the month, but later it was sold at 110 francs. In October the demand improved for the saponification

and several important transactions were closed between 170 and 180 francs, net cash. Soaplye glycerine was sold for delivery up to the first quarter of 1917 at 105 francs. In November prices for saponification were irregular, ranging from 165 up to 180 francs, and toward the close of the month there were a few sellers at 180 francs, net cash. Concerning soaplye, which had declined to 100 francs, the situation began to show marked improvement. During the second half of the month the British Government made very important purchases for delivery over the first months of 1917 at a price of 125 francs. Toward the close of November and early in December there were few sellers below 130 francs per 100 kilos.

EMBARGOES AFFECTED LONDON MARKET FOR ESSENTIAL OILS DURING PAST YEAR

In the essential oil classification the volume of turnover on the London market was moderate, home buyers being hesitant to purchase beyond immediate requirement and export being subjected to various official embargoes or unofficial restraints such as the difficulties in shipping, etc. In the following list the course of prices in the leading oils is traced, the reference being to spot unless otherwise indicated. Here remark may be made on the spurt bergamot had in August and September under the influence of primary "bull" tactics; on the uplift in caraway oil, largely through the Dutch Government prohibiting exportation; on the advance in gingergrass oil resulting from small arrivals; on the scarcity and high prices of guaiacwood oil in the second half of the year; on the very great stringency in supplies of juniper berry oil; on the sudden advance in otto of rose in the autumn; on the exaltation in patchoili and pennyroyal oils through inadequate supply, and on the big advance in sandalwood oil, which some people attribute to the manoeuvres of the Indian authorities who have perfected and extended their production and are credited with too-high price aspirations.

High, Low, Opening and Closing Prices.

	Open.	Close.	High.	Low.
	s. d.	s. d.	s. d.	s. d.
Almond, s.a.p....lb.	37 0	42 6	45 0	36 0
Anise, star	3 4	3 6	3 6	3 3
Bay	13 0	12 0	14 0	12 0
Bergamot, c.i.f.	11 9	16 0	25 0	11 6
Cajuput	4 0	3 6	4 0	3 4
Cananga	10 0	18 6	18 6	10 0
Caraway, 0.910	10 0	15 0	15 0	10 0
Cassia, 80-85 c.a.	4 3	4 4	4 6	4 1
Cedarwood	1 1	1 0	1 1	0 11
Citronella, Ceylon	1 7	1 9½	2 3	1 7
Java	3 9	3 6	4 0	3 6
Clove oil, English	5 4	5 10	5 10	5 2
Eucalyptus, B. P.	2 3	2 2	2 7	2 0
Geranium—				
Bourbon	10 0	11 6	13 0	10 0
Algerian	12 0	14 0	14 0	12 0
French	33 0	29 0	35 0	28 0
Gingergrass	6 0	10 0	10 0	6 0
Guaiac wood	8 0	*22 0	.. ..	8 0
Juniper berry	10 0	55 0	60 0	10 0
Lavender oil, French	13 6	17 6	19 0	12 6
Lemon oil, c.i.f.	3 6	4 0	4 6	3 6
Lime oil, distilled	6 6	9 0	9 0	6 6
hand pressed	8 0	11 0	12 0	8 0
Mustard	45 0	80 0	80 0	45 0
Nutmeg	3 6	6 0	6 0	3 6
Orange, c.i.f.	7 6	11 0	12 0	7 3
Rose (otto)—				
"own" distilled.oz.	45 0	*100 0	100 0	45 0
guaranteed pure	35 0	85 0	85 0	35 0
Patchouli	lb. 25 0	75 0	80 0	24 0
Pennyroyal	4 6	6 6	6 6	4 0
Peppermint—				
American, bulk	9 0	10 6	8 3	10 6
Sandalwood	31 0	48 0	50 0	31 0
Thyme oil—				
French, red	4 3	5 6	5 6	4 3
French, white	5 6	6 0	6 0	5 6
Wintergreen—				
Betula lenta	17 0	12 6	17 0	12 6
Wormseed	10 6	14 0	15 0	10 6

* In November; none available in December.

Perfume Chemicals.

In the group of perfume-chemicals notable progress in production has been made in England, especially in such articles as vanillin, turpinol, aubepine, thymol. Naturally the lines of larger consumption have absorbed the first attention of manufacturers, of whom one firm has announced its ability to supply the entire requirements of the United Kingdom in the three first-named articles, while thymol of English make from ajowan seed or thyme oil is now by no means a curiosity. In other directions such as the benzyl compounds and such bodies as geranyl acetate productive efforts are being put forward by companies whose expert chemists it is hoped will later turn their attention to manufacturing some of the more difficult perfumery substances in the synthetic group. English factories proceed cautiously in new departures, but there are reasons not only for congratulations on the progress already made, but for believing in further enterprise and expansion in this department. The scarcity in many of these articles has given a good deal of latitude to quotations, but a few indications may be given of the course of values, it being understood that the figures quoted were the nearest ascertainable to actual values at the time:—

	Open.	Close.	High.	Low.
	s. d.	s. d.	s. d.	s. d.
Amyl salicylate...lb.	11 6	12 6	15 0	11 6
Aubepine	20 0	40 0	40 0	20 0
Benzaldehyde	25 0	30 0	35 0	25 0
Benzylacetate	21 0	27 0	40 0	21 0
Benzylbenzoate	18 0	30 0	30 0	18 0
Coumarin	32 0	60 0	60 0	32 0
Heliotropin	12 6	27 6	27 6	12 6
Methylanthramilate	25 0	30 0	30 0	25 0
Methyl salicylate	16 9	6 0	16 9	6 0
Terpineol	3 3	3 0	4 0	2 10
Thymol—				
ex ajowan seed	55 0	32 6	55 0	32 6
ex thyme oil	45 0	30 0	45 0	30 0
Vanillin	42 6	27 0	45 9	27 0

The remarkable elevation in conmarin and heliotropin will be noted, as also the recessions in methyl salicylate, thymol and vanillin, although these articles are still a long way higher than before the war. The value of bromstyrol has usually been between 37s. 6d. and 40s. per pound and of citronellol between 35s. and 40s. Artificial musk in the ambrette variety when obtainable (rarely) fetched 170s. to 200s. and xylene has been quoted from 35s. to 40s. Heroline has generally commanded about 12s. per pound. Phenylethyl alcohol has seldom been offered and then at 120s. and 130s. per pound, while phenylacetic aldehyde has varied from 55s. to 75s. or more.

Quinine Market.

An authority in London reviews the bark and quinine market for 1916 as follows:—

Although export restrictions and shipping difficulties have hampered business to some extent, second hands have nevertheless been able to secure a share of the trade in competition with makers, as is evidenced by the further reduction of the London quinine stock to 1,226,120 ounces. The anticipation of further rushes on the London market, such as were experienced in 1915, has not been realized, owing principally to the increased production in Holland and Java. But despite this increase there are occasionally more than symptoms that the help of the second-hand market is required to fill the extraordinary demand prevailing and a general advance in prices is well within the range of possibility. Allied governments have been the principal buyers in London. Bark stocks in Holland and London are normal. Arrivals of bark in London have been comparatively large, both Bolivia and India having increased their exports. Some parcels of very rich Indian bark testify to the improvements in cultivation achieved in recent years; the calisaya barks were of the usual description and included a few parcels of flat bark. Java druggists' quills being in good supply, the calisaya quills have been mostly sold for quinine manufacture. The Indian Government factories have maintained their production of quinine, but their reserves of the alkoloid have probably diminished and fair quantities have reached India from London during the year.

The amounts of sulphate of quinine in the bark disposed of during the last three years by auction and private distribution are:—

	Kilos— Amsterdam.	London.
1916	481,510	10,888
1915	412,000	3,630
1914	365,033	6,851

The average analyses of Java manufacturing barks, catalogued at Amsterdam, and average unit prices obtained for the past three years, are as follows:—

	Analyses, per cent.	Units, cents.
1916	6.17	11.40
1915	6.25	6.20
1914	6.08	6.20

Stocks of bark, December 31:—

	Packages— Amsterdam.	London.
1916	47,308	5,912
1915	49,080	4,680
1914	68,444	4,117

Stock of quinine sulphate in London according to Port of London authority's returns:—

	Ounces.
1916, December 31	1,226,120
1915, December 31	1,535,616
1914, December 31	2,702,368

The fluctuations of bark and quinine prices during 1916 are given in the following table:—

BARK (UNIT.)

	Amsterdam. Cents.	London. d.
January	9.22	2
February	10.91	1½
March	11.95	1½
April	....	2½
May	14.18	2¼
June	12.99	2¼
July	13.71	2¼
August	14.48	2¼
September	10.31	2⅛
October	....	2
November	11.24	2
December	12.01	2

SULPHATE OF QUININE.

	Howard's. s. d.	Second hand. s. d.
January	2 3	3 6 to 4 0
February	2 3	3 10 to 4 0
March	2 3	3 9 to 3 6
April	2 3	3 6 to 3 3
May	2 3	3 3
June	2 3	3 0 to 2 9
July	2 6	2 9 to 3 0
August	2 6	2 8 to 2 6
September	2 6	2 6 to 2 4
October	2 6	2 4 to 2 3
November	2 6	2 11 to 2 8
December	2 6	2 6 to 2 8

The shipments of cinchona bark from Java during 1916 amounted to 17,152,800 Amsterdam pounds, which compares with 11,222,000 pounds in 1915 and 14,021,000 pounds in 1914.

But Two London Vanilla Auctions in 1916.

The public sales in London in 1916 were two and business in vanilla was for most of the period a matter of private negotiation. The prices at the auctions do not admit of very close comparison, but showed a decline on the year. At the event in September Seychelles fair to good medium to long firsts realized 8s@ 9s. 6d.—a somewhat similar range to that obtained at the last auction in 1915. At the public sales in December, 1916, about the same quality realized only 6s. 3d. to 8s. 6d. In November, 1915, fair to good long Wadagascar went at 8s. 3d. to 10s. per pound; in September, 1916, about the same quality fetched 7s. to 10s. Similar description of transitions in November, 1915, went at 8s. 9d. to 11s. 6d. and in March, 1916, at 7s. to 8s. 6d. There were no Madagascar or Mauritus at the September, 1916, event, but the tendency in the private market was easier.

Tahiti's Vanilla Bean Industry May Be Ruined.

The season of 1916 for Tahiti vanilla beans was devoid of any special interest, for, in spite of high prices for almost every other commodity, the price of Tahiti beans has been uniformly low during the year without any great fluctuation. Prices for green label ranged from $1.25 in January to $1.45 in July. After July they declined to $1.30, at which price they remained stationary until the first of the year when the market advanced to $1.35.

The price for yellow label, according to quality, was 15 cents and for white label approximately 25 cents higher than the green.

We analyze this condition as being caused by buyers in this country taking advantage of the closing of the usual outlet for the higher grades of Tahitis in Germany and the other European countries, thus causing the accumulation in this country of a large stock of Tahiti beans of the 1914-1915 crop. This surplus, due to continued small arrivals from the islands during the past year, together with an increasing export demand from Europe and also from Russia by way of Vladivostok, has been absorbed and today the stocks in first hands at San Francisco are estimated to amount to not more than 100 to 200 tins, which are entirely of the higher grades, that is, white and yellow label.

Statistically the position of Tahitis at this time should be very strong as the exports from the islands have gradually decreased and during the year only 2,200 tins were shipped to San Francisco, as against 3,156 in 1915, 3,012 in 1914, and 4,302 in 1913.

Two explanations may be given for this falling-off. For several years there has been a blight upon the vines in the producing islands of Tahiti, which is gradually killing off the old vines which are not replaced by the natives because of the low prices which they have received. The second reason is that more and more of the vanilla is going direct to France from Tahiti rather than by the way of San Francisco. The French colonial authorities have endeavored to stamp out this blight which is an insect infecting the soil in which the vanilla grows.

Last summer they had an expert from San Francisco visit the islands and study conditions that he might try and devise ways and means of counteracting the effect of the blight. His report has not as yet been published, but it is learned that he found conditions most serious and stated that if immediate steps were not taken the vanilla industry in Tahiti would be ruined.

The consumption of Tahitis in this country has been confirmed generally to the lower grades of green label variety and previous to the war all the higher grades were exported from here. Of late there has been more and more of direct buying with the islands by Europeans of the better grades of Tahitis, the white and yellow label variety.

They pay a better price than the San Francisco market can afford to pay and are gradually drawing more and more of the business into their hands. The result eventually will be that consumers of Tahitis in this country will have to look to Europe for their supplies and San Francisco will cease to be the distributing center. If the consumers would pay more attention to the better grades of Tahitis instead of merely using the poorer grades they would be much better satisfied, as intrinsically the value more than makes up the small difference in price.

The 1916-1917 crop is almost harvested and practically no further arrivals of consequence are looked for until next summer. With the present small stock in San Francisco and without further arrivals should there be any further demand from Europe or should there be further peace prospects undoubtedly prices will advance rapidly.

Record Year for Norwegian Codliver Oil Industry.

Aalesund, Norway, Dec. 31, 1916.

The year 1916 commenced on good conditions for business in codliver oil, as the stocks stored in the beginning of the new year was very much asked for at high rates. Meantime began both English and German buyers to compete in buying up the codliver oil, and under this competition the price reached the unsuspected height of kr. 575 ($160) per barrel f. o. b. for unrefined quality. The Lofoten fishery started later than usual, as the stormy weather hindered the fishing for about the whole of February. Meanwhile the weather turned to the better, so the fishery could continue steadily in March and April, and settled the last days of April with a result of 14.4 millions of cod, which yielded 15,938 hl. of codliver oil. The liver was very fat this year, with an average of 49 per cent. On account of the high prices, both on the fish and the liver, the year was a record year for the fishermen, as their profit was kr. 952 at an average for the whole fishery.

The Finmark fishery commenced under very unfavorable condiions. It appeared soon that there were very little fish on the fishing grounds and that the liver was leaner than usual the past years; at the same time the prices fell down to kr. 400 ($110) per barrel, unrefined quality. The fishery settled with a production of 8,972 barrels of codliver oil.

The price on codliver oil the whole summer and a part of the autumn was about kr. 400 ($110) per barrel. In November and December the inquiry was better, which affected prices so that they rose to about kr. 500 per barrel.

The great inquiry for all kinds of industrial oil and codliver oil has so affected all stocks that they have been quite sold out, so we have to commence the new season on good conditions.

The British Purchasing Agency has commenced to buy codliver oil, and the Norwegian Government has fixed the maximal price on this article to kr. 2.50 per kilo f. o. b. Norwegian port for unrefined quality. One tin-lined barrel contains 106 kilos net. As it is prohibited to export codliver oil, it is uncertain if the exporters in this trade will get license to export to America next year.

This year we have exported 47,000 barrels of codliver oil.

Production of Codliver Oil.

	Hectoliters.
1912	76,211
1913	48,262
1914	57,171
1915	52,918
1916	60,068

Exports of Codliver Oil.

	Barrels of 114 liters.
1912	61,461
1913	39,400
1914	63,083
1915	112,390
1916	47,000

Prices F. O. B. Norway.

	Per barrel.
1912	$20.00 to $15.00
1913	30.00 to 20.00
1914	15.00 to 20.00
1915	20.00 to 80.00
1916	85.00 to 160.00

Newfoundland Cod Liver Oil Outlook Bright.

Generally the demand for cod liver oil during January and February is very dull, as the wholesale buyers have laid in full requirements for the winter. The past year was an exception, as there was a continuous demand for all the finest non-freezing oil obtainable right through the winter.

During March and April the results of the Norwegian catch became known, and when the news was circulated that the whole of the Norwegian output had been purchased at the fabulous price of $7 per imperial gallon, it started the greatest excitement amongst our refiners of cod liver oil.

Everybody wanted to start refining oil. The Newfoundland government recognized the splendid opportunity to extend this business. They saw that some control was needed or the output would be one of quantity regardless of quality and therefore detrimental to the best interests of the country.

The government wisely passed a law making it necessary for every person to take out a license before any factory could be started.

The Minister of Marine and Fisheries was placed in charge and he drew up rules and regulations of a stringent nature. He named two supervisors to visit all the factories and see that these rules were carried out.

One of these men was the well known Norwegian instructor, M. B. Simonsen, who has given such satisfaction in recent years. By his patient and painstaking work he has brought the quality of the Newfoundland oil up to a very high standard.

It was Mr. Simonsen's business to teach the men a uniform method of producing the sweet, white oil. Mr. Coyle, the other inspector, followed up this work in a vigorous way and in several cases closed up the factories of careless men.

It was a happy combination and the results of the season's work have been exceedingly gratifying to the government. They established a control that had a most wholesome effect and will show its good effects for years to come.

Our fishing operations start in June and were just getting into good shape when the news came that the output of the Norwegian oil was arriving in England and having a most depressing effect on prices.

It then became known that the British Government had outbid the German Government and had secured practically the entire output of Norwegian production.

This put a very considerable damper on the trade. Many of the refiners closed up their factories or reduced their operations so that they could work in a more economical way.

It is impossible to give any statistics of this season's work, but the demand for oil has been exceedingly good. Our exporters arranged for reasonable figures and throughout the season have sold freely at very much less figures than it could be obtained elsewhere.

The Newfoundland oil is now being exported to all quarters of the globe and gaining a name on its own merits.

Mr. Simonsen, the Norwegian expert, states that he never saw better oil and the quality is certain to be appreciated more and more when it becomes better known among the chemists that the Newfoundland oil comes wholly from the livers of codfish, whereas the Norwegian product is very largely a mixture of all kinds of livers.

The outlook for Newfoundland cod liver oil is exceedingly bright and the prejudice that some had had, has now died out.

The Newfoundland Government has received many complimentary remarks for the able way they are carrying out the modern method of a strict government supervision that is needed everywhere to give confidence to the most conservative buyers.

The following statistics will give some idea as to the export during recent years. Government figures to end of June each year:—

	Gallons.
1903- 4	191,403
1904- 5	114,506
1905- 6	59,781
1906- 7	51,547
1907- 8	48,015
1908- 9	93,780
1909-10	44,307
1910-11	83,999
1911-12	51,277
1912-13	36,484
1914-15	47,170
1915-16	142,837

High Prices and Smaller Production in Sponge Fisheries, 1916.

Reviewing the sponge fisheries for 1916, the most impressive feature has been the remarkably high prices, exceeding all former records. Although the crops have not come up in quantity to former years, the higher prices received have offset the limited catch. Stocks of Mediterranean are far below former years, the war naturally having greatly curtailed and lessened the supply, the fishermen having had to quit the industry. Many firms are short of the fine Greek toilet varieties.

Sponge divers with headquarters at Tarpon Springs, Florida, have not had an overabundance of success in finding new sponge beds. The amount and size of the year's catch has been considerably under former seasons. A noted decline in the better grades has taken place. Fear is expressed that, despite the various laws intended to protect the industry and growth to a certain size, slowly but surely our American territorial waters are becoming denuded of the better grades. The highly prized true Rock Island sheepswool producing beds are pretty well fished out and inferior Gulf varieties are being shipped under the designation "Rock Island"—a softer and less durable article.

In order to overcome the matter of adulterated sponges some dealers are offering sponges of a given size and measurement by the piece and reconstructing the method of marketing, as in selling by the piece it obviously is no object to "load" sponges with weight-making adulterants. "Loaded" sponges often bring about disputes and controversies over sponge bills, which unpleasantness is remedied when sold by measurement or piece.

Pieces at the primary Florida fisheries ruled as follows:—

	Pound.
Forms Florida Rock Island sheepswool, 1 to 2 pieces to pound	$4.25
Forms Florida Rock Island sheepswool, 2 to 3 pieces to pound	4.35
Forms Florida Rock Island sheepswool, 3 to 4 pieces to pound	4.50
Forms Florida Rock Island sheepswool, 4-6, 6-8, 8-10	4.75
Forms Florida Rock Island sheepswool, 10-12	4.45
Forms Florida Rock Island sheepswool, 12-16	3.50
Forms Florida Rock Island sheepswool, 16-20	2.50
No. 2 Rock Island, medium sizes	2.25
Cut Rock Island, medium sizes	3.50@4.00
Cut Rock Island sheepswool	3.45
Cut Rock Island small sheepswool	1.60
Yellow medium sizes	1.00@1.25
No. 2 yellow	.60
Andote grass	.40

Products of the Bahama fisheries sold on average as follows:—

	Pound.
Nassau sheepswool forms, medium sizes	2.30@2.60
Nassau sheepswool forms, small sizes	1.60
Nassau sheepswool cuts, medium sizes	2.30@2.50
Nassau sheepswool No. 2, medium sizes	1.30
Nassau velvet, medium sizes, cuts or forms	1.30@1.45
Nassau velvet, small sizes	1.25
Nassau velvet, second quality	.90
Nassau velvet, third quality	.25
Nassau reef, forms No. 1	1.50@1.75
Nassau reef, No. 2	.50
Nassau grass, No. 1 medium	.50@ .65
Nassau grass, No. 2	.30
Nassau grass, No. 3	.04@ .06
Nassau yellow No. 1, medium sizes	.65
Nassau yellow No. 2, medium sizes	.40
Nassau yellow, No. 3	.20
Nassau hard head, forms No. 1	.95
Nassau hard head, cuts, No. 1	.80
Nassau hard head, No. 2	.45
Nassau hard head, No. 3	.15
Nassau hard head, slate	.25

Less 4 per cent. tare on bale.

The most absorbing feature of interest to the owners of various sponging craft has been the big advance in provisions and breadstuffs. Nearly all material and provisions used by the Bahama sponging fleet—of some 500 vessels—is drawn from New York, and alarm is expressed that the business cannot be continued on as large a scale as formerly owing to the prevailing abnormal market on foodstuffs.

It must be explained that owners of sponging vessels provision and outfit craft, advancing and risking the outlay on the craft making a successful trip on their own risk. In gold mining it is grub staking. In submarine harvesting of sponges it is the same "grub-staking" plan. The probabilities are that 1917 will see a short crop.

ONE OF GREATEST YEAR'S IN HISTORY OF CHEMICAL TRADE RECORD OF 1916

Domestic Producers Called Upon to Supply Home Demand and Increasing Call From Abroad—Highest Prices Ever Known.

The movement of chemicals during the year under review will probably go on record as one of the greatest in the history of the trade. Domestic producers have not only been called upon to supply an enormous increase in the consuming demand at home, but to satisfy requirements on a large scale in all parts of the world. Production in many items has increased under the stimulus in business and this gradual expansion in American output has finally checked, to some extent at least, the advancing tendency in many departments. It must be admitted that the home producer has been given a market for his products little dreamed of prior to the beginning of the European conflict.

This catastrophe has opened new export consuming channels and consumers have paid the highest prices ever known for chemical materials. Under heavy chemicals the demand for caustic soda, soda ash and bleaching powder was so great that producers sold their entire output on contracts running over the year. This prevented first hands from being factors in the spot market and afforded second hands and speculators an opportunity to control immediate shipments through their resale offerings. These three chemicals have been in very active request for foreign shipment owing to the inability of foreign producers to meet war-time requirements. Carbonate of soda, bicarbonate of soda and other descriptions of soda followed closely in the wake of the great basic material, soda ash.

Acid Production.

Manufacturers of acid experienced a similar business to those of the soda producers and many disposed of their output covering a period from January to December. This made it difficult for consumers to place additional orders and gave second hands a chance to work off resale goods at a satisfactory profit. It is reported that the production of sulphuric acid has been increased materially, and in 1917 it is believed that consumers will find it easier to secure requirements. The munition factories took enormous quantities of sulphuric and nitric acids, while the absence of potash forced a large sale of fertilizers in which sulphuric acid is the base.

Makers of tartaric acid and crystals were unable to meet contract specifications, and these interests were behind on their orders during a greater part of the year. Spot crystals commanded as high as 5c. a pound premium over the contract price at intervals. While the movement of chemicals classified in our miscellaneous department was somewhat similar to the course established by heavy chemicals and acids, there were several items that displayed a tendency to settle down to a more normal basis.

The Ammonias.

Aqua ammonia, ammonia alum, copperas, etc., ruled comparatively steady throughout the year. Acetate of lime worked gradually downward and closed at the minimum trading basis for the year. Blue vitriol broke sharply from its record price at the beginning of the year and never recovered its loss.

Potash products revealed the most inherent strength owing to the scarcity and extremely high prices of the basic material, muriate of potash. Commercial white arsenic, after following an irregular course, strengthened rapidly at the close of the year on active buying by glassmakers and paris green producers, who had allowed their stocks to dwindle with the idea that they could purchase arsenic at more attractive figures. The market for white sal ammonia, became oversold late in fall, and spot offerings were very scarce, with buyers paying record prices. A feature which caused considerable complaint during the year was the trouble experienced in getting transportation companies to handle shipments promptly. Delays in shipping resulted in embarrassing conditions at several points. We heard of paper mills closing down owing to their inability to get sulphur.

The following table shows the latest census figures on several chemicals and affiliated products, giving the value of these products compared with 1909:—

Five-Year Production, Chemicals and Affiliated Products.

Industry.	Total value of products		Per cent. of increase,
Chemicals—	1914.	1909.	1909-1914.
Acids	$30,001,364	$24,325,602	23.3
Alums	3,467,969	3,022,355	14.7
Bleaching materials	4,964,403	3,215,728	54.4
Cyanides	2,398,674	1,941,893	23.5
Plastics	13,895,784	7,472,732	86.0
Sodas and sodium products—			
Sodas	22,616,696	20,061,505	12.7
Other sodium products	8,280,572	.....	...
Compressed or liquefied gases	8,097,720	5,184,437	56.2
Chemicals produced with the aid of electricity	29,061,649	18,451,461	60.8
Allied products—			
Dyestuffs and extracts	20,576,739	15,954,574	29.0
Essential oils	2,565,361	1,773,304	44.7
Explosives	41,453,339	40,139,661	3.3
Fertilizers	168,388,405	111,871,481	50.5
Paints and varnishes	149,049,820	127,472,819	16.9
Petroleum refining	396,361,405	236,997,659	57.2
Soap	135,340,499	115,455,172	17.2
Wood distillation	10,236,332	10,215,901	0.2

The prime factor causing the present inflation of chemical prices is the European war. When peace is restored, our chemical market will likely see a revision of prices on a lower basis probably as spectacular as the advance. Below are market reviews on various chemicals with price tables appended for comparative purposes.

Bicarbonate of Soda.

The tendency of prices has been slowly but persistently upward during the past year. The strong conditions prevailing in soda ash greatly increased the cost of production, and closing prices recorded an advance in bicarbonate of soda equal to 55c. per hundred pounds. Makers experienced a satisfactory demand, and no important accumulations reached second hands for resale. The following table shows the price variations in bicarbonate of soda for each month during the past year. Prices are week end and are on the pound basis in barrels at works:—

	1916	
	High.	Low.
January	1.50	1.20
February	1.60	1.50
March	1.65	1.60
April	1.65	1.65
May	1.65	1.60
June	1.65	1.60
July	1.65	1.65
August	1.65	1.65
September	1.65	1.65
October	1.65	1.65
November	1.65	1.65
December	1.75	1.65
Year	1.75	1.20

Bleaching Powder.

The highest prices ever paid for this item were recorded during January and February when business was booked at 14c. a pound. Demand throughout the entire year has been unusually active as makers have not only been called upon to meet an increased home consumption, but to cover requirements all over the world. Early bookings were so heavy that scarcely a producer could quote on contract after June. During the last six months of the year, second hands controlled the spot market and consumers were able to secure resale offerings to satisfy wants. Competition among these interests caused a gradual easing of prices. The low figures of the year were recorded in October and November when sales were made at 4¼c. a pound. Export packages have commanded a premium of 2@2½c. a pound over the large drums used for domestic consumption. Following is a table of spot prices per pound for the past four years. The figures are based on the closing quotations each successive week on the pound basis:—

	1913		1914		1915		1916	
	High.	Low.	H.	L.	H.	L.	H.	L.
January	1.35	1.30	1.25	1.15	1.37½	1.30	14	13
February	1.40	1.35	1.20	1.15	1.37½	1.30	14	9½
March	1.40	1.30	1.20	1.15	1.37½	1.30	10¾	8
April	1.35	1.30	1.20	1.17½	1.40	1.40	8½	8
May	1.30	1.22½	1.25	1.20	1.40	1.30	8½	6
June	1.25	1.25	1.25	1.20	1.37½	1.37½	8	6
July	1.25	1.20	1.20	1.20	1.40	1.37½	8	4¾
August	1.20	1.20	4.00	1.20	2.00	1.50	6½	4¼
September	1.25	1.20	3.00	2.00	2.50	1.75	6	4¼
October	1.20	1.20	2.00	2.00	4.50	2.50	6	4½
November	1.20	1.20	2.00	1.75	6.00	4.00	6¼	4¼
December	1.20	1.20	1.50	1.37½	11.00	6.00	6¼	4¼
Year	1.40	1.20	4.00	1.15	11.00	1.30	14	4¼

Caustic Soda (76@78 Per Cent.).

This market opened the year under very strong conditions. During the previous fall nearly every important producer had disposed of his yearly output on domestic and foreign contracts and new consumers were forced to apply to second hands to cover wants. The embargoes on exports of this material levied by foreign countries forced many foreign consumers to purchase their requirements in America. This foreign buying with an enormous increase in domestic business kept our producing plants running to capacity throughout the entire year. The highest price recorded was in February, when sales were made at 6¼@6½c. a pound flat on spot. Resale lots came out more freely as the season progressed on account of the relatively high prices prevailing, and these eventually brought values down. The lowest figures were registered in July and August when business was booked at 3½c. a pound flat. In September prices recovered to 4c. a pound, and the market was maintained at or above this level throughout the balance of the year. Below is a table showing the high and low flat prices recorded during each month of the past year. Prices are on the pound basis and are compiled from week end figures:—

	High.	Low.
January	6	5½
February	6½	6
March	6¾	6
April	6	5¾
May	6	5
June	5½	4½
July	5	3½
August	4	3½
September	4¼	3½
October	4¼	4
November	5	4¼
December	4¾	4½
Year	6½	3½

Sal Soda.

Year-end prices reveal a net advance of 10c. per hundred pounds. Goods were scarce in the spring, owing to active home and export business, and the high cost of soda ash. Later producers worked under more favorable conditions, and the market became easier. Resale lots had a tendency to unsettle prices. Below is a table of prices for 1916. These figures are compiled from closing quotations each successive week, and are on the 100-pound basis, in bags or barrels. Kegs were held at premiums of 15c. cwt. over the following quotations:—

	1916	
	High.	Low.
January	$1.00	$0.85
February	1.10	1.00
March	1.25	1.10
April	1.50	1.25
May	1.50	1.25
June	1.25	1.00
July	1.15	1.00
August	1.15	1.00
September	1.15	1.00
October	1.15	1.00
November	1.15	1.10
December	1.10	1.10
Year	1.50	.85

Soda Ash 58 Per Cent. Light.

The year has been phenomenal in the consumption of American soda ash. Domestic producers have been called upon to practically supply the alkali demands of the world, and business has been on an enormous scale, with producers withdrawing from the market during the summer months because they sold their capacity on contracts. During the latter part of the year second hands controlled the spot market with their resale offerings and this kept prices unsettled. Below is a table showing the high and low flat prices each month for light 58 soda ash during 1916. The figures are compiled from the closing quotation each successive week, and are on the pound basis:—

	1916	
	High.	Low.
January	4¼	1¾
February	4½	4
March	4½	3½
April	3½	2¾
May	3¼	2¾
June	3	2¾
July	3	2¾
August	3½	3
September	3½	3
October	3½	3
November	3¼	3¼
December	3½	3.05
Year	4½	1¾

Acetic Acid 28 Per Cent.

Prices of this acid have been governed chiefly by the variations in the basic material—acetate of lime. Business for export has been very active in the higher tests, and during the first six months of the year spot offerings were very small, with leading producers unwilling to quote except to old consumers. After July offerings became freer, and prices gradually weakened under increased competition. The following table shows the high and low spot prices of acetic acid in the New York market for each month during the past three years. These figures are based on the closing quotation each week and represent the pound basis in cents:—

	1914		1915		1916	
	H.	L.	H.	L.	H.	L.
Jan.	1.77½	1.62½	1¾	1¾	10	6
Feb.	1.77½	1.62½	1¾	1¾	10	8
March	1.65	1.50	1¾	1¾	10	8½
April	1.65	1.50	2	1¾	8½	7¼
May	1.65	1.50	2	2	7¼	5¼
June	1.65	1.50	2½	2	6¾	5¼
July	1.65	1.50	2¾	2½	6	5¾
Aug.	1.65	1.50	2¾	2¾	6	5
Sept.	1.65	1.50	3	3	5	3½
Oct.	1.65	1.50	3¼	3	4	3½
Nov.	1.65	1.50	5	3¼	4	3½
Dec.	1.90	1.75	7	3¾	5	4

Muriatic Acid 22 Degrees.

The tendency of this market was irregular, the highest prices being recorded in June under an active demand from the color and dye makers. The year closed at practically the same price basis upon which it opened. Resale lots were freer during the last six months, and competion remained keen all through the latter part of the year. Below is a table showing high and low monthly prices for 22-degree acid for 1917. Prices are on the pound basis, and are compiled from figures

prevailing at the close of each successive week:—

	1916 High.	1916 Low.
January	3½	2¼
February	3½	3
March	3½	3
April	3½	3
May	4	3
June	5	3½
July	4	3½
August	3½	2½
September	2½	2¼
October	2½	2¼
November	2½	2¼
December	2¼	2
Year	5½	2

Nitric Acid 42 Degrees.

A pronounced scarcity of spot offerings was noted during the first five months of the year. This was caused by enormous sales to the explosive makers. After this period a moderate increase in production took place and offerings gradually became freer, thereby depressing spot values. Below is a table showing prices for 42 degree nitric acid during the past year. Figures are based on the closing quotations each successive week and are on the pound basis:

	H.	L.
January	9¼	8½
February	9¼	8½
March	9¼	8½
April	9¼	8½
May	9¼	8¼
June	8¼	8
July	8¼	8
August	8	7¼
September	7½	7
October	7¼	6½
November	6¾	6½
December	6½	6
Year	9¼	6

Oxalic Acid.

Uncertainty has featured the price movements in this acid. The scarcity of available material during most of the year checked active buying, and the spot market was subject to the views of second hands. Later in the year arrivals of Dutch oxalic created an easier feeling, and prices gradually yielded from the previously established high points. The following table shows the high and low spot prices of oxalic acid per pound in the New York market for each month during 1914, 1915 and 1916. These figures are based on the closing quotation each week and represent the pound basis in cents:—

	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
January	7½	7	13	12½	60	50
February	7½	7¾	13	12½	64	60
March	7⅞	7⅞	13	12½	80	64
April	7¼	7¼	19	18	80	75
May	7⅞	7¼	19	19	75	71
June	7¼	7¼	24	19	72	65
July	7¼	7¼	30	25	66	58
August	20	12	40½	35	61	58
September	21	20	44½	40	62	60
October	18	14	48	41	62	57
November	14	13	51	50	59	54
December	13	13	51	50	54	47
Year	20	8	51	12½	80	47

Sulphuric Acid.

The production of sulphuric acid in the United Staes in 1916 was much greater than in 1915. The estimated production of sulphuric acid of strengths of 50 deg., 60 deg. and 66 deg. in 1916, expressed in terms of 50 deg. acid, is 4,475,000 tons, an estimated increase over the production in 1915 of 600,000 tons, or more than 15 per cent. The increase was distributed about equally betwen acids of strengths of 50 deg. and 60 deg., as there was a small decrease in the production of acid of strength of 66 deg.

The most notable feature in the sulphuric acid industry was the enormous increase in the production of acids of strengths greater than 66 deg. The estimate shows a production of these stronger acids of over a million tons as against a production of less than 200,000 ton in 1915. It is not feasible to express the amount of these higher acids in terms of 50 deg. acid; therefore the total given for them is in addition to the total given for acids of strengths of 66 deg. or less.

The estimated output of acids of strengths of 60 deg. and 66 deg. includes by-product acid produced at copper and zinc smelters. The output of acid so produced in 1916, expressed as 60 deg. acid, amounted to nearly 950,000 tons, or practically the same as in 1915. However, over 110,000 tons of acid of higher strengths was produced at these smelters, a quantity nearly double that produced in 1915.

The market conditions throughout the country are reported to have been on the whole better than in 1915, and the value of the product will probably be somewhat higher than it was even during that year of high prices.

The estimates are based on returns received by Philip S. Smith, of the United States Geological Survey, Department of the Interior, from more than 95 per cent. of the producers and on estimates of the outputs of the rest. It is believed that the figures are reasonable and that they will approximate very closely the final figures, which will be made up when the complete returns are received.

The following table shows the prices of sulphuric acid 66 degrees in car lots. The figures are compiled from prices prevailing at the close of each successive week, and are on the pound basis:

	1916 H.	1916 L.
January	3	2
February	3	2½
March	3	2½
April	3	2½
May	3	2½
June	3	2¼
July	2¼	1½
August	2	1½
September	2	1½
October	2	1½
November	2	1½
December	2	1½
Year	3	1½

Tartaric Acid Crystals.

Makers sold their output on contract early in the year and few were in a position to accept much outside business after June. This kept the spot market in very limited supply and gave second hands an opportunity to scalp profits on resale lots. Crystals were in very active request, particularly for export purposes. The subjoined table shows the highest and lowest quoted prices of tartaric acid crystals in the New York market for each month since January, 1913, and also the highest and lowest points touched in each year from 1913 to 1917. The figures are based on the closing quotations each successive week:—

TARTARIC ACID CRYSTALS.

	1913. H.	1913. L.	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
Jan.	30¾	30¼	31½	31½	40¾	37½	62	52
Feb.	30¾	30¼	31½	31½	40¾	37½	70	55
March	30¾	30¼	31½	30½	40¾	37½	77	66
April	30¾	30¼	30½	30¼	39	38	85	66
May	30¾	30¼	30¾	30¼	40¼	39	79	66
June	30¾	30¼	30¼	30¼	48	48	75	66
July	30¾	30¼	30¼	30¼	48	44	72	66
Aug.	30¾	30¼	75	30¼	46½	46½	70	66
Sept.	32¼	30¼	80	70	46½	46½	70	66
Oct.	32¼	31¾	55	50	47	46½	70	66
Nov.	32¼	31¾	48	42¾	52	47	70	66
Dec.	32¼	31¾	44	40¾	55	49	70	66
Year	32¼	30¼	80	30¼	55	37½	85	52

Acetate of Lime.

The highest prices for this chemical were established during the first half of the year. Heavy demand from the acid and acetone makers taxed the capacity of acetate of lime producers and available offerings for additional wants were kept at a very low state. Later in the year makers caught up with contract specifications and the feeling became easier, with prices being reduced to 5.05c. in September and 3.50c. in October. The latter price remained unchanged over the balance of the year. The following table gives the high and low contract prices of acetate of lime in the New York market for each month since January, 1913, and also the highest and lowest points touched in each year from 1913 to 1917. The figures are based on the closing quotations each successive week:—

	1913. H.	1913. L.	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
Jan.	2.55	2.50	1.80	1.75	2.05	2.00	7.05	6.00
Feb.	2.55	2.50	1.80	1.75	2.05	2.00	7.05	7.00
March	2.55	2.50	1.55	1.50	2.05	2.00	7.05	7.00
April	2.55	2.50	1.55	1.50	2.56	2.50	7.05	7.00
May	2.55	2.50	1.55	1.50	3.05	2.50	7.05	7.00
June	2.55	2.50	1.55	1.50	3.55	3.50	7.05	7.00
July	2.55	2.50	1.55	1.50	3.55	3.50	7.05	7.00
Aug.	2.55	2.50	1.55	1.50	3.80	3.75	7.05	7.00
Sept.	2.55	2.50	1.55	1.50	4.05	4.00	5.05	3.50
Oct.	2.05	2.00	1.55	1.50	4.55	4.00	3.55	3.50
Nov.	2.05	2.00	1.80	1.75	5.10	4.50	3.55	3.50
Dec.	2.05	2.00	2.05	2.00	6.10	5.00	3.55	3.50
Year	2.55	2.00	2.05	1.50	6.10	2.00	7.05	3.50

Arsenic.

The lowest prices for this chemical were recorded at the beginning of the year, and there was relatively little activity noted during the entire first half of the period under review. Domestic consumers during the interval allowed their stocks to run low, and the stationary prices prompted comparatively few to look ahead. The belief was general at this time that prices would eventually settle to a more attractive buying basis. Late in the fall domestic consumers, particularly the glass and paris green makers, attempted to buy for replenishment and found the market in limited supply with traffic conditions preventing much spot being obtained. Prices advanced sharply during November and December, and the market closed at the best figures of the year with the tendency upward. Below is a table of spot prices in the New York market for each month since January, 1913, also the highest and lowest points touched in each year from January 1, 1913, to December 31, 1916, inclusive. These figures are based on the closing quotations each successive week:—

	1913. H.	1913. L.	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
Jan.	5	4¾	2⅞	2⅞	4	4	5½	3⅞
Feb.	4½	3¼	3⅛	3	4	4	6½	5¼
March	4⅜	4½	3½	3	4	4	6½	6½
April	4½	4.00	3	3	4	4	6½	6½
May	4	3⅜	3	3	4	4	6½	6¼
June	3⅜	3⅜	3	3	3¾	3¾	6½	6½
July	3⅜	3⅜	3	2.80	3⅜	3½	6½	6
Aug.	3⅜	3¼	5	2.80	3⅜	3⅜	6¼	6
Sept.	3.25	3.17½	5	5	3¾	3½	6¼	5¾
Oct.	3.20	3.00	5	5	3½	3½	6¼	6
Nov.	3¼	3.00	5	5	3½	3½	7⅜	6¼
Dec.	3¼	3.00	4½	3⅞	4½	3½	8¼	8
Year	5	3.00	5	2⅞	4½	3½	8¼	3⅞

Barium Chloride.

Makers oversold the market early in the year and prices established a new high trading level. Later, production increased and offerings gradually became freer, thereby easing values. The difficulty experienced in getting goods from abroad shifted practically the entire demand upon domestic producers. At times the scarcity of spot goods was pronounced and the market was in a rather nominal condition. The following table shows the high and low spot prices of chloride of barium per ton in the New York market for each month during the past three years. These figures are based on the closing quotations each week, using the ton basis in dollars and cents:

	1914 High.	1914 Low.	1915 High.	1915 Low.	1916 High.	1916 Low.
Jan.	32.00	32.00	50.00	50.00	110.00	110.00
Feb.	32.50	32.00	50.00	50.00	140.00	130.00
March	32.50	32.00	50.00	50.00	140.00	140.00
April.	32.00	32.00	65.00	60.00	140.00	140.00
May.	32.00	32.00	67.50	60.00	140.00	130.00
June.	32.00	32.00	70.00	67.50	130.00	110.00
July.	32.00	32.00	100.00	70.00	125.00	105.00
Aug.	100.00	32.00	110.00	100.00	110.00	100.00
Sept.	150.00	130.00	100.00	95.00	110.00	100.00
Oct.	100.00	90.00	100.00	85.00	110.00	100.00
Nov.	90.00	60.00	115.00	90.00	110.00	100.00
Dec.	65.00	53.00	115.00	100.00	100.00	95.00
Year.	150.00	32.00	115.00	50.00	140.00	95.00

Blue Vitriol (Large Crystals).

Heavy export business at the beginning of the year resulted in new high prices for this sulphate when sales were recorded at 23c. a pound. The restricted production of the material abroad forced many foreign consumers to look for supplies in America, and leading producing concerns here have placed a splendid export business at the best prices on record. After initial sales had been made for foreign shipment, demand subsided sufficiently to allow a more favorable trading basis, and the tendency was gradually downward until August and September, when car lots sold at 8c. a pound. From this basis prices recovered to 14c. at the close of the year. Numerous resale lots came on the market during the latter part of the year, and these had a tendency to keep spot prices unsettled because of the keen competition among second hands. The following table shows the highest and lowest quoted prices of blue vitriol per pound in car lots for each month since January, 1913, and also the highest and lowest points touched in each year from 1913 to 1917. The figures are based on the closing quotations each successive week:—

	1913. H.	1913. L.	1914. H.	1914. L.	1915. H.	1915. L.	1916. H.	1916. L.
Jan.	5½	5½	4.84	4.80	4.55	4.35	23	14½
Feb.	5½	5¼	4.80	4.80	4.55	4.35	22	20
Mar.	5¼	5¼	4.80	4.80	4.55	4.35	21	17
Apr.	5¼	5¼	4.80	4.80	6.75	6.00	20	17
May	5¼	5¼	4.80	4.65	7.00	6.75	20	14½
June	5¼	5¼	4.65	4.65	7.25	7.00	15	9
July	5¼	5¼	4.65	4.50	7.25	7.25	10	8
Aug.	5¼	5.00	4.50	4.50	7.25	7.25	10	8
Sept.	5.00	5.00	4.50	4.50	7.25	7.25	10¼	8½
Oct.	5.00	5.00	4.50	4.35	7.00	6.50	12¼	10
Nov.	5.00	5.00	4.35	4.35	7.25	6.50	14	12½
Dec.	5.00	5.00	4.35	4.35	13.00	7.00	23	8
Year	5½	5.00	4.80	4.35	13.00	4.35	..	....

Brimstone.

This market has remained at a stationary price of $30 a long ton, New York basis, and at $30.50 Baltimore. Domestic producers have experienced the greatest demand during the past year ever known for this product, and while no figures are obtainable at this writing as to the actual consumption, it is believed to be far in excess of any other year on record. The most unfavorable feature that buyers have experienced was the inability of railroads to handle shipments promptly. Freight rates have ruled abnormally high, and these with the general congestion have been the cause of complaint between both buyers and sellers. Reports have been current of small consumers closing their plants owing to their inability to get supplies. The advance of the year found conditions steadily growing worse in the shipping line, and the close showed a deplorable situation from a transportation point of view. Leading sellers urged consumers to buy far enough ahead to discount freight delays, but many of the smaller paper mills, etc., have not storage capacity for more than thirty days. Sicilian brimstone has not been a factor in the American market, and Japan has sold most the surplus sulphur in the country to Russia. American producers, therefore, have not experienced foreign competition to any great extent. The estimated production of Sicilian sulphur for 1916 is 270,000 tons, against 319,260 tons in 1915. No figures are given on the consumption, but the consumption for 1915 is placed at 359,784 tons. Stocks at Italian shipping points on December 31 are placed at 323,860 tons. The scarcity of labor in Italy and the higher cost of production resulting from increased operating expenses caused prices to advance to $40 a ton at their coast. The Sicilian production has been confined practically to Italy.

The Chlorates.

An active demand has featured these markets during a greater part of the year. Heavy foreign purchases have caused periods in which the market was almost bare of supplies. Late in the year resale stocks came upon the market and second hand competition had a tendency to unsettle spot quotations, with the result that prices for small quantities sold under the views of leading factors. Large lots, however, were firmly held at maximum quotations, and considerable business was placed for home and export purposes. Below are price tables of chlorate of potash and chlorate of soda. Quotations show the high and low for each month during 1916, and are compiled from the closing figures each successive week on the pound basis:—

Chlorate of Potash.

	1916 High.	1916 Low.
January	50	45
February	65	50
March	75	65
April	75	75
May	75	70
June	70	53
July	70	47
August	70	45
September	70	51
October	70	60
November	70	67
December	70	66
Year	75	45

Chlorate of Soda.

	1916 High.	1916 Low.
January	25	25
February	35	25
March	35	35
April	35	35
May	35	25
June	35	35
July	35	27
August	35	30
September	35	28
October	35	28
November	35	27
December	35	26
Year	35	25

Caustic Potash, 88@92 Per Cent.

The constant scarcity of foreign goods and the abnormally high cost of producing here on account of the scarcity and strength of muriate of potash have kept prices at a relatively high level all year. Under such conditions small lot trading has predominated and sales during the early part of the year were made at $1 a pound, the highest price ever recorded. Soapmakers have been the principal buyers. In the following tables are the high and low prices for 88@92 per cent. caustic potash for each month during the year 1915 and 1916. The prices are on the pound basis and compiled from the closing figure of each successive week:—

	1915 H.	1915 L.	1916 H.	1916 L.
January	9	8	70	62
February	9	8	1.00	65
March	9	8	1.00	95
April	25	20	1.00	90
May	23	23	1.00	85
June	38	30	95	84
July	40	40	90	86
August	39	38	90	85
September	39	38	90	85
October	40	39	90	83
November	60	41	95	85
December	60	60	95	87
Year	60	8	1.00	62

Refined Saltpeter.

High prices for muriate of potash and nitrate of soda greatly increased the cost of producing refined saltpeter and the market has ruled steady with only occasional price depressions due to resale offerings. During the latter part of the year the tone was very firm with the market in upward tendency. The following table shows the high and low spot prices of refined saltpeter in the New York market for each month during the past three years. These figures are based on the closing quotation each week for granular in car lots at cents per pound:—

	1914 H.	1914 L.	1915 H.	1915 L.	1916 H.	1916 L.
Jan.	5¼	4¾	8	7	38	35
Feb.	4¾	4¼	8	7	38	35
March	4¾	4¾	8	7	38	35
April	4¾	4¾	12¼	12	36½	35
May	4¾	4¾	12¼	12¼	36½	35
June	4¾	4¾	15	12¼	36½	29¾
July	4¾	4¾	17	17	30¾	25
Aug.	8	4	18	18	25	25
Sept.	12	9	18	18	32	25
Oct.	9	8	18	18	32	31
Nov.	8	7	38	18	33	31
Dec.	8	6¾	38	35	35	31
Year	12	4¾	38	7	38	25

Price Increases Marked London Chemical Market.

Generally speaking supply of heavy chemicals has been inadequate to the demand, and this, associated with the higher cost of production, has resulted in pronounced increases in selling rates. Dearer sulphuric acid has, in part, contributed to higher charges for alum and ammonium copper and iron sulphates. Higher cost of mining and freights have influenced upward movements in arsenic, borax, boracic acid, saltpeter and sodium nitrate. Potash salts have been scarce and have mostly advanced—permanganate being much dearer. Ammonia has moved up and also the compounds into which it enters. Sulphur has had a remarkable augmentation, reflecting the curtailment of shipments from Italy, etc. Bleaching powder has ascended through the depletion for war's purpose of available supplies. The citrus acids were both manipulated up to about 4s., but have since receded to somewhere about their starting points.

The following table summarizes the movements in 1916 of some of the more important chemicals, prices being spot:—

	Open			Close			Highest			Lowest		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Acetic acid, glacial, cwt.	0	140	0	0	160	0	0	265	0	0	115	0
Arsenic, Cornish white, cwt.	0	210	0	0	440	0	0	500	0	0	210	0
Arsenic, cornish white, cwt.	0	28	0	0	42	0	0	42	0	0	28	0
Ammonium sulphate, ton.	0	320	0	0	352	6	0	352	6	0	305	0
Bleaching powder, ton.	0	400	0	0	640	0	0	700	0	0	400	0
Boracic acid, cwt.	0	43	0	0	57	0	0	57	0	0	43	0
Borax, cwt.	0	25	0	0	34	0	0	34	0	0	25	0
Citric acid, lb.	0	2	8	0	2	6	0	4	0	0	2	4
Carbolic acid, crude 60 per cent., gal.	0	3	5	0	3	4	0	3	6	0	3	4
Carbolic acid, crystals, 39 degrees C., lb.	0	1	4	0	1	3	0	1	6	0	1	3
Copper sulphate, ton.	45	0	0	65	0	0	65	10	0	44	10	0
Cream of tartar, 98 per cent., cwt.	0	185	0	0	182	6	0	205	0	0	180	0
Epsom salts, ton.	0	300	0	0	280	0	0	350	0	0	260	0
Iron sulphate, ton.	0	90	0	0	100	0	0	170	0	0	90	0
Oxalic acid, lb.	0	1	4	0	1	7	0	1	9½	0	1	4
Potash, caustic, 88-90 per cent., cwt.	0	320	0	0	305	0	0	350	0	0	300	0
Potashes, Montreal, cwt.	0	155	0	0	160	0	0	210	0	0	130	0
Potassium bichromate, lb.	0	1	6	0	1	6	0	2	6	0	1	6
Potassium carbonate, 96-92 per cent., cwt.	0	180	0	0	150	0	0	180	0	0	120	0
Potassium chlorate, lb.	0	1	5	0	2	6	0	2	7	0	1	5
Potassium permanganate, lb.	0	4	9	0	11	6	0	12	0	0	4	9
Potassium prussiate, lb.	0	3	6	6	4	0	0	4	6	0	3	6
Sal ammoniac first lump, ton.	55	0	0	70	0	0	70	0	0	55	0	0
Saltpeter refined, cwt.	0	50	0	0	67	0	0	67	0	0	50	0
Sodium bicarbonate, ton.	0	140	0	0	160	0	0	180	0	0	140	0
Sodium nitrate, ton.	16	15	0	20	0	0	20	5	0	16	15	0
Sulphur flowers, ton.	0	240	0	0	400	0	0	400	0	0	240	0
Tartaric acid, lb.	0	2	6½	0	2	7	0	3	11	0	2	6

NEW YORK FERTILIZER MARKET FOR YEAR GENERALLY HELD TO BE SATISFACTORY

Only About Half Usual Takings at the Outset of 1916, but in the Fall Demand for Mixed Fertilizers Brought Good Prices.

The census report for 1914 was issued during the year, and gives a detailed report on the fertilizer industry, with comparisons for 1909. Reports were received from 1,124 fertilizer establishments in 1914, the total products of which for the year were valued at $168,388,405. Of these 1,124 establishments, the principal business of 784 was the manufacture of fertilizers; 179 were cottonseed-oil mills; 63 were engaged primarily in the rendering of grease and tallow, and 43 in slaughtering and meat packing, and the remaining 55 establishments were distributed among some 15 industries, such as the manufacture of soap, glue, canned fish, bone products, fur goods and leather goods, which produce waste material of fertilizing value.

Output in 1914.

The output of fertilizers in 1914 aggregated 8,414,959 net tons, valued at $152,815,786, consisting of 4,488,565 tons of complete fertilizers, valued at $97,046,825; 1,116,739 tons of ammoniated fertilizers, valued at $24,344,271; 1,760,290 tons of superphosphates, acid phosphates and concentrated phosphates, valued at $16,145,659, and 1,049,365 tons of other fertilizers, valued at $15,279,031. In addition, there were manufactured for sale other products to the value of $15,572,619, including oil, glue, grease, bone black, sulphuric acid, chemicals, etc. The value of the fertilizer products reported by establishments engaged primarily in other lines of manufacture included above was $15,192,253.

At the census of 1909 there were reported 843 establishments — comprising 550 engaged primarily in the manufacture of fertilizers and 293 that produced fertilizers as a subsidiary product—the output of which was valued at $111,871,481. Of this amount $100,089,971 represented the value of 5,618,234 tons of fertilizers and $11,781,510 the value of other products.

The value of all products in 1914 was thus $56,516,924, or 50.5 per cent. more than in 1909; and the output of fertilizers in 1914 exceeded that in 1909 by 2,796,725 tons, or 49.8 per cent., in quantity, and by $52,725,815, or 52.7 per cent., in value.

Poor Start for the Year.

The fertilizer trade in the early part of the year left much to be desired. Demand was not up to expectations, and during the early spring some manufacturers complained that consumers were not taking much more than one-half of their usual allotments. The fall season, however, found a good call for mixed fertilizers, and, as good prices were secured by manufacturers, the year was generally regarded as favorable financially to producers. Among the features of the material market may be mentioned the increase in home production of sulphate of ammonia. The sold-up position of the market in the latter part of the year shows, however, that there is still room for expansion in order to make this country independent of outside sources.

Shipping Conditions Marked Factor.

Shipping conditions were prominent in the market for some materials. For instance, high ocean freights on nitrate of soda helped to put up values here. Exports of phosphate rock were small, but this was due not so much to scarcity of vessels as to the shutting off of markets which are large consumers of phosphate rock under normal conditions. In the latter part of the year shipments by rail from one part of the United States to another were affected by the congestion on the railroads, and undesirable delays resulted. The menhaden fishing season was not successful in Northern waters, but a fair catch resulted in the South. Prices for scrap were strong at all times, and returns to producers were proportionately high, so that the season was a success financially, even though the amount of scrap produced was not as large as in some preceding years. Dried blood and tankage were in comparatively small supply at all times, and stocks were well controlled. The highest prices on record were paid for both dried blood and tankage in the Chicago market in the latter part of the year.

Sulphate of Ammonia.

The increase in production of ammonium sulphate in the United States during 1916 was the greatest ever recorded. An estimate of the actual production of all ammonia at coke and gas plants places the total at 325,000 tons (sulphate equivalent). This shows an increase of 47.7 per cent. over the production of 220,000 tons in 1915. By-product coke ovens produced 272,000 tons, or 83.7 per cent. of the total.

The following estimates are based on the known capacity of by-products coke plants now operating or under construction:—

	No. of ovens.	Estimated working capacity in ammonium sulphate. Tons per year.
Completed plants (coke ovens), January 1, 1916....	6,190	266,140
Completed plants (coke ovens), January 1, 1917....	6,990	319,900
Under construction (coke ovens), January 1, 1917....	2,137	142,560
Actual production at gas plants, 1916		53,000
Total capacity, coke and gas plants, 1918		515,460
		Per cent.
Growth in capacity of coke ovens, 1916 to 1917		20.2
Growth in capacity of coke ovens, 1917 to 1918		44.5

It is probable that the full capacity of coke ovens and gas works will reach in 1918 580,000 tons or more of ammonium sulphate, i. e., about 120,000 tons of nitrogen. The demands of the industries for nitrogen, both in ammonia and in nitrate of soda (excluding export products and fertilizers), do not exceed 70,000 tons of nitrogen per annum. For ammonia alone they are not over 25,000 tons of nitrogen.

Stocks Well Sold Up at Close.

In spite of the increase in domestic production, stocks were well sold up in the latter part of the year, and imported grades became more prominent. With German supplies cut off, interest centered in the English markets. The export trade of Great Britain for the year is shown as follows:

Exported to—	1916. Tons.	1915. Tons.
France	24,721	11,430
Spain and Canaries	67,378	68,370
Italy	2,004	7,071
Dutch East Indies	79,737	93,967
Japan	9,155	10,537
United States	6,258	16,377
British West India Islands	11,803	12,755
Other countries	58,256	73,346
Totals	259,312	293,853

Domestic and Foreign Sulphate Prices.

At the beginning of the year domestic sulphate was offered at $3.75 per 100 pounds, and English sulphate was quoted at $4 per 100 pounds. Restrictions on shipments of sulphate from the United Kingdom placed the market in a nominal position. Offerings of domestic sulphate were increasing in volume, and the diminution in foreign supplies was not felt. During the summer prices for domestic sulphate held at $3.40 per 100 pounds for quite an interval.

As demand increased in the fall prices began to stiffen, and later in the year the sold-up position became a factor and limited stocks strengthened prices, and at the close stocks were so closely sold that prices were entirely nominal. During the closing months of the year imported grades came in for a better inquiry, and prices were strong, with closing quotations at $4.30 per 100 pounds.

Nitrate of Soda.

The nitrate of soda industry was featured in many ways in the year under review. With reference to the industry in this country, it is found that shipments to and actual arrivals in domestic ports were much larger than ever before in the history of the trade. As there did not appear to be any large stock on hand at the close of the year, it is inferred that the bulk of arrivals was absorbed by consumers, and that consumption was larger than in preceding years. Turning to the point of production, it is noted that the output in Chile established a new high record, and shipments from there also were larger than ever before. The total production for the twelve months has been about 63,200,000 quintals, against 38,200,000 quintals last year and 53,500,000 quintals in 1914. Shipments to all parts have been about 64,000,000 quintals, against 44,000,000 quintals in 1915 and 40,100,000 quintals in 1914.

Stocks in Chile at the end of the year were 16,300,000 quintals, as compared with 17,099,000 quintals a year previous.

Early Fear of Accumulation.

There were fears in many quarters at the beginning of the year that prices for nitrate would be depressed by accumulation, and it was thought that the only way to maintain a firm market would be to limit production. The statistical position at the end of the year proved the fallacy of this. For the greater part of the period there was a scarcity of tonnage for moving nitrate from Chile, and in view of this the shipments were especially noteworthy.

Price Range for Year.

High ocean freights were influential during the year in establishing prices at consuming markets. Opening the year sellers quoted nitrate in the local markets at $3.25 per 100 pounds. Increased ocean freights were responsible for upward revisions in January, and in February the high point of $3.90 per 100 pounds was reached. As prices went higher demand fell off somewhat, and resale lots began to appear on the market. As a result, prices weakened. During the summer months the tone of the market was easy. By September the low level of $2.90 per 100 pounds was reached. A firmer tone was noted from then on till the end of the year, and closing prices were $3.25 per 100 pounds, which was identical with the quotation at the beginning of the year. The unusual demand for nitrate of soda in domestic markets was due to the wider use of this product in the explosives trade. Fertilizer manufacturers were normal buyers or better, but without the heavy buying from makers of munitions this country could not have absorbed the record receipts.

Phosphate Rock.

According to returns for 1915 there was a marked decrease in the amount of phosphate rock sold in that year. Sales for 1915 are placed at 1,835,667 long tons, valued at $5,413,449. This is a decrease of almost 900,000 tons as compared with the amount marketed in 1914. Figures for 1916 are not yet available, but as the foreign demand was restricted by inability to make shipments it is expected that sales also will compare unfavorably with those for 1914. Conditions in the phosphate rock industry were touched upon in a government report issued during the year. The report stated that soon after the outbreak of the European war the phosphate mining companies of Florida — not only the companies that produce the higher grade of rock for export, but also those that supply the domestic trade—either curtailed production very materially or suspended mining entirely.

Shipments of phosphate rock to Germany, which hitherto has been a large consumer, have, of course, almost entirely ceased, and those to other countries have been seriously interrupted. The active call for sulphuric acid and the high prices quoted tended to cut down production of acid phosphate, and thus showed up demand for phosphate rock from domestic consumers. These conditions were true for 1916 as well as for 1915, but some of the plants in Florida, after closing for a lengthy period, again started to operate, and stocks are being stored, so as to meet the urgent export demand which is expected to be met as soon as shipments can be made.

Large Florida Stocks.

It is evident, therefore, that stocks in Florida are large and are increasing, but this is not a depressing influence on the market. Prices for phosphate rock during the year were pretty steady. At the beginning of the year quotations were:—Florida land pebble, $1.75@3.25, f. o. b. Port Tampa; South Carolina, kiln dried, $3.50@3.75, f. o. b. Ashley River; Florida high-grade rock, 77 per cent., $5@6.25, f. o. b. Florida ports; Tennessee rock, 79@80 per cent., $5@5.50, f. o. b. Mount Pleasant; 75 per cent. guaranteed, $4@5, and 68@72 per cent., $4.25@4.50. In the closing month of the year Florida land pebble stiffened in price. Sellers who were offering freely at the lower level were reporetd to have disposed of their stocks. This caused other holders to put up their prices, and the inside figure was placed at $2 per ton.

Fish Scrap.

The manhaden fishing season started in Southern waters the first of June, though the boats were out before that in the North. Returns in the North were very poor, so poor that some companies did not operate very long, and all the boats had cut out before the end of the season. Returns from the Chesapeake were poor in the earlier part of the season, but the catch improved later on, and in spite of pessimistic reports the total catch showed up fairly well. Good prices were realized on sales of fish scrap, and the season was financially successful for Southern operators. There were practically no stocks on the market when the new fishing season started, and the buying movement for the new production of scrap was active enough to keep supplies from accumulating. Hence the market was free from selling pressure, and the high prices obtained for other animal ammoniates also acted as a bullish factor. In the early part of June, when the first supplies of fish scrap were on the market, sellers were quoting $3.50@3.75 per unit of ammonia. This price was f. o. b. Southern works. This price did not attract buyers, and in a short time the price was lowered to $3 per unit. The market then recovered gradually under pessimistic reports on the catch of fish. Fishing operations continued until well into November, but stocks of scrap were small at that time, and had passed from producers. The closing prices represented the figures asked for resale lots, and were $4.35 and 10.

Potash Salts.

From the time hostilities broke out in Europe shipments of potash salts from Europe to this country began to fall off. During 1916 imports into this country were far below those of 1915 and were insignificant when compared with the amounts normally received. Shortage of supplies, therefore, was the outstanding market feature. Muriate of potash opened the year with $475 per ton quoted, and sales were made early in January at $465 per ton. At this price muriate was not attractive to the fertilizer trade and practically all sales during the year were to chemical manufacturers. The number of chemical manufacturers who could use murite to advantage also was limited. Hence, actual consuming demand was quiet for the greater part of the period. Stocks were pretty well controlled, but at times odd lots were thrown on the market and sold at concessions.

There was a gradual decline in prices for muriate in the first half of the year and in June offers were made as low as $265 per ton, which was the lowest open quotation during the year. The market held close to $300 per ton in July and August. Early in September sales were made under the $300 level, but later in the month the asking price was advanced to $400 per ton. From that time to the end of the year prices were firm, and the closing quotation was $450@460 per ton. In the latter part of the year Japanese muriate was on the market at prices considerably under that asked for the German grade. Sulphate of potash was quiet throughout the period and prices at times were wholly nominal. The same is true of kainit and manure salts.

The supply of kainit and its importance in 1916 may be inferred from the fact that only thirty-six tons were imported in the year. Offerings of domestic potash were on the market in greater volume than ever before, but were not large enough to make up to any extent for the loss in imports.

In the early part of the year a government report was issued showing that production of potash in the United States in 1915 amounted to a value of $350,000. Production figures for 1916 are not yet available, but will show a good gain over 1915.

How War Limited Potash in Fertilizer.

The fertilizer business for 1916 has been continued in many cases under conditions presenting great obstacles. The continuance of the war, with the resultant stopping of all potash shipments, made it necessary to continue the introduction of limited quantities of potash into fertilizers. Some of this potash containing material was originally of German origin, but during the current year, with the incentive of high prices for potash, many domestic sources have been investigated.

The Armour interests were probably the first to produce potash on a commercial scale and in large quantities in this country, and their plant at Marysville, Utah, is credited with a production of thirty tons of sulphate of potash a day from alunite.

The kelp beds of the Pacific have also supplied a considerable quantity in the aggregate of potash-containing material, varying in test from 12 per cent. to 25 per cent. of actual K-20. This has also been used for fertilizer purposes, as have

various trade wastes of varying composition.

Dust from cement kilns has been recovered and in instances contains from 9 per cent. to 14 per cent. of potash.

The United States Government is reported as considering at the present time the compulsory recovery of potash-containing materials from all by-products in the various industries of the country.

In spite of the curtailment of potash supplies, the largest manufacturers are still offering 2 per cent. of potash in their goods, though the high price of potash compared to normal times, and the fact that in many instances such satisfactory field results were obtained by the farmers with goods containing no potash, have resulted in very large sale of fertilizer containing only ammonia and phosphoric acid. It may have been due to the splendid climatic conditions, which were almost ideal in this locality for growing crops during the past spring and summer that the goods containing no potash made such a favorable showing in the field. A rough estimate would seem to show that at least 75 per cent. of the fertilizer used in 1916 contained no potash at all.

The sulphuric acid question, which became very serious in 1915, has continued without abatement. The manufacture of munitions and other heavy chemicals has called for so much sulphuric acid that the fertilizer manufacturer who buys his acid has been compelled to meet the most severe competition for this product, which has sold at the highest figures ever known in the trade. Manufacturers of sulphuric acid, on the other hand, have been experiencing new high costs of production, due to increasing ocean freight rates on pyrites, high cost of labor, lead, and all other items which enter into the cost of manufacture.

Phosphate rock has been abnormally low in price at the mines in Florida, due probably to the cutting off of exports, as a large tonnage in the past has gone to German ports. On the other hand, coastwise freights have been so high that many shipments of rock have moved by rail to destination, which formerly were covered by schooner or barge.

The consumption of fertilizer, on the whole, has been equal to the previous year, and the fertilizer manufacturers deserve no little credit for having adjusted themselves so rapidly and so well, to the abnormal conditions recently prevailing.

BALTIMORE FERTILIZER TRADE REVIEW FOR 1916 RECORDS MANY REAL CHANGES

Baltimore, Jan. 15, 1917.

Balances have been struck and accounts adjusted, and the members of the fertilizer trade of Baltimore are in a position to take a survey of the results which have been achieved in 1916. On the whole the last year is to be pronounced satisfactory. The volume of business, perhaps, did not come up to expectations and the members of the trade were left in a state of uncertainty during a large part of the time, but, when all is said, the fact remains that the summing up is better than the manufacturers and dealers felt encouraged to hope for at least in some months, and 1916 will go down into fertilizer history as a period that tried the resourcefulness of the trade, but vindicated in a splendid manner the stability and the importance of the business as a whole.

Considered from the standpoint of quantity as well as with respect to monetary value, the fertilizer trade made distinct gains over 1915, which is all the more gratifying since a very general readjustment and a revision of methods had been made necessary by reason of the fact that some of the crude materials had been practically eliminated from consideration, while others were offered in much reduced quantities volume, which made it necessary for the manufacturers of mixtures to have recourse to other supplies and virtually to educate the consuming public anew. Much money and time had been spent in making propaganda for certain supplies which were cut off by the war, so that a revamping of formulas became essential, and the buyers had to be influenced to change their attitude toward brands previously used, for the reason that conditions forced a change in the composition of these brands. This work has been successfully accomplished by the fertilizer trade, in which, of course, Baltimore holds a foremost rank, and thanks to the work done the business is today on a sounder basis than perhaps ever before. It is in this respect that the fertilizer men of this city are entitled to the highest commendation. They rose not only equal but superior to the situation and managed to restore order out of chaos, as it were.

Business Ahead of Other Years.

Estimated quantitatively, Baltimore's fertilizer business in 1916 is perhaps to be placed ahead of all other years. Gains that must be regarded as entirely normal were maintained in the face of very adverse circumstances, and the tonnage turned out doubtless marks a new record. Gauged by its money value, the business must also be held to have touched a new mark. A survey made in 1913 by one of Baltimore's foremost men of affairs placed the value of the fertilizer trade of this city at not less than $15,900,000, including fertilizer substances and acids mainly used in the manufacture of fertilizer mixtures. This was before the European war, when prices ruled very much lower than they have since then.

Value of Last Year's Trade $25,000,000.

It would be a very conservative calculation to place the increase in the value of materials since then at not less than 25 per cent. As a matter of fact, acid phosphate, for instance, is today quoted at $11 to $12, as against a normal price of $7.50 and $8, which means a rise of much more than 25 per cent., being nearer 50 per cent. But, taking the very lowest basis that can well be allowed—and it will be seen that the value of the trade last year cannot have been less than $20,000,000, and probably went considerably above this total. The sum named does not make any allowance for the natural gain in business, estimated at 12 per cent. a year, which in the three years that have elapsed since the survey was made would bring the total value of Baltimore's fertilizer trade up to approximately $25,000,000 in 1916. This city, for that matter, easily retains its place as the foremost center of the fertilizer business in the country and in the world, for it is well known that artificial fertilization and the use of artificial fertilizers are farther advanced in the United States than anywhere else on the habitable globe, a statement which has some justification in this connection in order that the status of the Baltimore fertilizer industry may be properly fixed. As previously stated, the rade here made gains both in quantity and with regard to value, new records being set in both directions. The beginning of 1916 was not auspicious and three or four succeeding months failed to improve upon the prospect. High expectations were entertained by the manufacturers of mixtures concerning the demand, but the South had not yet recovered from the prostration and unsettlement caused by the war and the slump in cotton prices, while the North was still to experiene the benefit of the extraordinary rise in the prices of all agricultural products since realized and hardly found itself in a position to be a liberal buyer. Furthermore, the climatic conditions were against a large distribution of fertilizers. It will be remembered that the winter lingered exceptionally long in the lap of spring, as it were, and the farmers were disappointed in their expectations as to early planting. Then, when the weather did improve and it looked as though the deficiency in the demand for fertilizers might be made up, a prolonged drought came along, and hopes that the earlier shortage might be compensated for at least in part had to be put aside.

Summer Well on Before Strength Came.

Not until the summer was well advanced did the agricultural interests begin to obtain very decided encouragement. The continuation of the war had given rise to an extraordinary demand for foodstuffs of all kinds, while crops everywhere suffered more or less from bad weather. Throughout Europe a deficiency in the yield of the leading cereals, and in fact all crops, was noted, and in the United States the situation proved to be not much better. This caused a fairly steady advance in prices of farm products and the farmers began to buy fertilizers in larger volume than it had seemed for a time they would want. Even the outlook in the South improved in consequence of the rise in the price of cotton eventually to the highest figures since the Civil War, and the outlook for ferilizers was accordingly strengthened.

On top of this greater demand for mixtures naturally came a marking up of the prices for crude stocks. Even in 1915 tnere had been some receipts of certain materials previously used in very large quantities. These receipts ceased entirely in 1916 and the embargo became complete and absolute. This shutting out of stocks drawn upon to a very great extent before of course threw additional burdens upon the sources supplying other stocks, and it followed inevitably that the quotations should be marked up. It had become necessary for the manufacturers of mixtures to inform their customers that they would have to get along wihout potash mixtures, and this propaganda began to show real results.

Volume Stronger as Year Closed.

The latter part of 1916 took on an increasingly satisfactory aspect. Orders were held back for a time and the movement was rather slow in developing, but the season was lengthened considerably, and in the end the volume of business ran ahead of the previous year and most other years, in fact. Furthermore, the revision of prices that was made necessary by the great advance in crude stocks carried the returns into such high ground that the year wound up with the manufacturers as well as dealers in much better shape than they had reason to expect early in 1916. All probably did more business than they had done in 1915, and on a far more remunerative basis. Buyers who at first hesitated because they were told they could not get the old mixtures which they had been accustomed to, and even more so for the reason that they considered the quotations too high, eventually were forced by the logic of the situation to meet the terms of the seliers, and the high prices which the farmers received impelled them to make liberal purchases.

Prospects for 1917 Excellent.

The prospects for the new year may be regarded as excellent. One of the greatest obstacles to a good business—holding back on the part of the purchasers because of advances in the quotations—has been overcome. The ideas of the consumers of fertilizers have worked up to the higher level, and it will not be hard to hold them there if conditions should warrant a continuance of the prevailing lists. In fact, higher prices having been once established, the fertilizer manufacturers may be able to obtain them even when crude materials have eased off somewhat, it being far less difficult to maintain a certain range than to work up to it. With the prices farmers to invest heavily in fertilizers of agricultural products of all kinds holding the advances made or even going beyond, as has been the case of late with wheat, there is every incentive for the in order that the crops may be swelled as much as possible, for the world will need them, regardless of whether the war is ended now or not. At the same time the fact is to be kept in sight that the stocks of crude materials have only not increased, whatever may be said about the demand, but have even been diminished, because various materials, among them potash, are virtually eliminated from this market. While thus an augmented inquiry for mixtures is to be lookeu for, the trade is without means to add to the volume of stocks available for the manufacture of these mixtures.

Supply of Nitrates and Ammoniates Narrowed.

Nitrates and ammoniates, moreover, have been drawn upon freely as a result of other special requirements, so that the supplies procurable for the fertilizer trade are distinctly and seriously narrowed. Under these circumstances it is hardly possible to escape a maintenance of the prevailing quotations, with a prospect of a still further rise, though the cessation of war would almost at once cut off one very important requirement, that of nitrates and other materials for munitions. Even in this event the fertilizer trade may be expected to remain good, since the soils in various countries have been impoverished by the exigencies of the war, and this deficiency must be compensated for.

The remarkable range of prices for crude stocks that prevailed during the year is strikingly shown in the subjoined tables, which give the quotations approximately at the beginning of each month, the intervening weeks being productive of fluctuations in between the figures supplied. The quotations were about as follows:—

Price Ranges in 1916.

Tankage, Blood and Fish Scrap.

	Tankage, 11 and 15.	Blood.	Fish scrap.
January	$3.40	$3.40	...
February	3.45	3.37½	...
March	3.55	3.35	...
April	3.37½	3.17	...
May	3.00	3.00	$3.30
June	3.00	2.90	3.10
July	2.95	2.95	2.85
August	3.30	3.17½	3.35
September	3.47½	3.47½	3.60
October	3.67½	3.90	3.95
November	4.15	3.85	4.00
December	4.20	4.10	4.75

Acid Phosphate, Nitrate of Soda, Sulphate of Ammonia.

	Acid phosphate— 14½	16½	Nitrate of soda.	Sulphate of ammonia.
January	$13.50	$14.00	$3.24	$4.00
February	13.50	14.00	3.75	4.10
March	13.50	14.00	3.90	4.10
April	13.25	13.75	3.40	3.70
May	12.00	13.00	3.15	3.60
June	11.00	12.00	3.08	3.55
July	10.50	11.00	3.07½	3.40
August	10.50	11.00	3.02½	3.47½
September	10.50	11.00	3.00	3.70
October	10.50	11.00	2.90	4.00
November	10.50	11.00	2.90	4.25
December	11.00	12.00	3.12	4.30

Potash.

	Kainit.	Muriate, per ton	Sulphate.
January	...	$475.00	...
February	...	480.00	...
March	...	...	...
April	...	...	...
May	...	...	...
June	...	290.00	...
July	...	...	...
August	...	296.00	...
September	...	...	...
October	...	...	...
November	...	...	...
December	...	...	...

Bone.

	4½ and 50, ground, raw.	3 and 50 ground, steamed, in bulk.	1 and 60 bone-flour, in bags.
January	$32.00	$27.00	$27.00
February	32.00	28.00	27.00
March	32.00	28.00	27.00
April	32.00	28.00	27.00
May	32.00	28.00	27.00
June	32.00	28.00	27.00
July	32.00	28.00	27.00
August	32.00	28.00	27.00
September	32.00	28.00	27.00
October	32.00	28.00	...
November	35.00	30.00	...
December	34.00	30.00	...

Potash Virtually Abandoned by Trade.

It will be observed that quotations on potash are few and far between, this being the result naturally of the cessation of shipments. While the first two or three months of 1915 made some additions to the stocks of potash in this country by imports, all of the last year presents a blank in this respect, and under the circumstances all quotations were merely relative. They could not even be called approximations, and the fertilizer trade practically abandoned the use of potash as an ingredient, dismissing it from consideration.

This naturally invites attention to the imports of crude stocks as a subject of importance in that it shows to what extent supplies from abroad were cut off and the manufacturers of the United States were dependent upon home resources. The returns of the Custom House disclose a very heavy decline in the importations of fertilizer materials, a result at once of the embargoing of shipments by the operations of the warring nations and perhaps as much in consequence of the reduction of ocean-going tonnage and the pre-emption of this tonnage by countries at war to provide actual necessities. Thus the shipments of potash from Germany to the United States ceased entirely, while the receipts of sulphate of ammonia, a product largely shipped in times of peace from the United Kingdom, were heavily reduced. Furthermore, the curtailment of these receipts was not accompanied by an increase in the arrivals of other materials, the necessities of the war and the lessening of sea tonnage evidently serving to limit such traffic. Only in the imports of pyrites was there an increase, and this cannot well be credited to the fertilizer trade, for much of the business of the producers of sulphuric acid has been with manufacturers of munitions.

It is probable that old stocks have been drawn upon more freely than before to make up in part at least for the deficiency in the imports, but the fact remains that the home resources had to be relied on more extensively than ever, and the volume of the business done in mixtures splendidly attests the extent of these resources and their availability. The receipts of crude stocks, together with their declared value, compared with the figures for 1915, were as follows:—

Receipts of Crude Stocks.

Nitrate of Soda.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	8,896	$216,862	.....	.....
Feb.	6,280	126,215	6,676	$150,658
March	.....	.....	.....	.....
April	23,300	551,102	15,081	282,866
May	24,059	508,830	10,540	348,427
June	.....	.....	11,852	412,617
July	26,021	692,311	5,882	120,044
Aug.	.....	.....	5,800	162,868
Sept.	1,352	34,949	10,685	209,614
Oct.	.....	.....	.....	.....
Nov.	8,480	197,287	.....	.....
Dec.	6,682	193,699	10,459	268,455
Tot.	105,849	$2,521,255	76,975	$2,016,149

Ammonia, Sulphate of.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	289	$21,515	1,884	$107,122
Feb.	503	38,911	803	47,218
March	.....	.....	610	33,875
April	.....	.....	1,364	81,751
May	148	11,367	422	25,725
June	78	5,779	141	8,839
July	.....	.....	167	8,757
Aug.	.....	.....	.....	.....
Sept.	.....	.....	.....	.....
Oct.	.....	.....	.....	.....
Nov.	.....	.....	103	7,414
Dec.	.....	.....	443	34,393
Tot.	1,008	$77,312	5,937	$355,074

Kainit.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	.....	.....	176	$1,012
Feb.	.....	.....	328	1,385
March	.....	.....	.....	.....
April	.....	.....	.....	.....
May	.....	.....	.....	.....
June	.....	.....	.....	.....
July	.....	.....	.....	.....
Aug.	.....	.....	.....	.....
Sept.	.....	.....	.....	.....
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
Tot.	.....	.....	404	$2,57

Manure Salts.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	.....	.....	2,587	$31,581
Feb.	.....	.....	325	2,459
March	.....	.....	1,088	8,709
April	.....	.....	.....	.....
May	.....	.....	.....	.....
June	.....	.....	.....	.....
July	.....	.....	.....	.....
Aug.	.....	.....	.....	.....
Sept.	.....	.....	.....	.....
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
Tot.	.....	.....	5,000	$42,850

Muriate of Potash.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	.....	.....	4,567	$172,001
Feb.	.....	.....	4,203	158,187
March	.....	.....	350	10,633
April	.....	.....	.....	.....
May	.....	.....	.....	.....
June	.....	.....	.....	.....
July	.....	.....	.....	.....
Aug.	.....	.....	.....	.....
Sept.	.....	.....	.....	.....
Oct.	.....	.....	.....	.....
Nov.	.....	.....	1	216
Dec.	.....	.....	.....	.....
Tot.	.....	.....	9,121	$341,147

Sulphate of Potash.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	.....	.....	459	$18,897
Feb.	.....	.....	888	36,874
March	.....	.....	13	1,692
April	.....	.....	.....	.....
May	.....	.....	6	610
June	.....	.....	.....	.....
July	.....	.....	.....	.....
Aug.	.....	.....	.....	.....
Sept.	.....	.....	50	920
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
Tot.	.....	.....	1,416	$58,393

All Other Fertilizers.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	.....	3578	.....	$5,135
Feb.	.....	2,554	.....	8,248
March	.....	2,718	.....	30,4 8
April	.....	3,248	.....	2,550
May	.....	1,089	.....	910
June	.....	10,176	.....	511
July	.....	.....	.....	23,317
Aug.	.....	1,969	.....	.....
Sept.	.....	411	.....	688
Oct.	.....	11,705	.....	.....
Nov.	.....	9,900	.....	21,032
Dec.	.....	4,358	.....	7,382
Tot.	.....	$48,716	.....	$90,241

Pyrites.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	37,692	$181,562	12,812	$72,494
Feb.	29,108	177,743	10,493	56,360
March	23,489	136,324	12,639	52,705
April	13,884	85,440	8,792	54,969
May	31,616	155,216	7,475	31,428
June	17,167	110,512	23,253	142,750
July	13,652	108,361	21,644	112,674
Aug.	10,398	54,270	37,413	196,876
Sept.	6,846	97,300	7,509	65,941
Oct.	.....	.....	26,186	163,827
Nov.	12,767	80,152	12,801	77,267
Dec.	24,781	182,108	5,630	19,373
Tot.	221,400	$1,368,988	186,647	$1,036,724

Bone Dust and Bone Ash.

	1916 Tons.	1916 Value.	1915 Tons.	1915 Value.
Jan.	823	$16,633	.....	.....
Feb.	.....	.....	.....	.....
March	.....	.....	.....	.....
April	.....	.....	.....	.....
May	.....	.....	896	$22,875
June	.....	.....	61	1,943
July	.....	.....	.....	.....
Aug.	.....	.....	757	15,968
Sept.	.....	.....	.....	.....
Oct.	.....	.....	500	9,549
Nov.	.....	.....	.....	.....
Dec.	.....	.....	502	12,334
Tot.	823	$16,633	2,716	$62,669

Menhaden Fisheries Fair at Season's Close.

In this connection mention should be made of the results of the menhaden fishing in the lower Chesapeake Bay and along the Atlantic coast, one of the largest sources of animal ammoniates drawn upon by the fertilizer trade. Various months during the season were decidedly unsatisfactory, unfavorable weather, but more the unaccountable scarcity of menhaden, serving to restrict

the catch. In the latter half of the season, however, a marked improvement took place, and in the end the quantity of scrap manufactured attained very impressive proportions. This, together with the high prices realized for scrap and the exceptional returns on fish oil, made the season one of the best which has been experienced for three or four years and greatly encouraged the fishing companies. The price of scrap ranged well with tankage and blood, even though it did not run ahead, as has ben the case in the past at different times, while the returns on oil went up to 70c. or more a gallon. This enabled the fish factories to come out in excellent shape, despite the fact that the fleet was reduced by three or four steamers, and left the menhaden men in a buoyant frame of mind. The lower Chesapeake Bay, it should be explained, is one of the chief menhaden fishing grounds and upward of fifty steamers are annually engaged in fishing operations.

Improvements During the Year.

The confidence of the fertilizer men in the situation manifested itself strikingly in the making of extensive improvements. Within the year the sulphuric acid producing capacity of Baltimore has been greatly increased, the Davison Chemical Company having put into operation additions that almost double its output. The new plants of the Baugh Chemical Company and of the Standard Guano Company have also been completed and are now turning out acid on an impressive scale. These two plants were designed primarily to serve the needs of the fertilizer factories operated by the respective corporations, and have not thus far been important factors as competitors of other producers in the fertilizer trade. But no doubt is entertained by those well informed that the output of these plants will be enlarged in excess of the requirements of the companies themselves and that they will in course of time bid for outside business.

The F. S. Royster Guano Company has also augmented its acid producing facilities, but its works are intended only to meet its own needs. No new fertilizer factories have been erected, and the only new construction of this kind has been a replacing of facilities destroyed by fire in the course of the year and an overhauling and extension of existing plants, like that of the G. Ober & Sons Company at Locust Point.

The fertilizer men of Baltimore have entered upon the new year with the utmost confidence in the future, and the prospect ahead of them has seldom been brighter. They occupy a well established position and will experience no difficulty whatever in keeping this city in the forefront of the trade, the largest producer of artificial fertilizers in the world.

Recapitulation.

Below is given a recapitulation of the figures embodied in the preceding tables:—

	1916		1915	
	Tons.	Value.	Tons.	Value.
Sulphate of ammonia	1,908	$77,312	6,937	$355,074
Nitrate of soda	105,849	2,521,255	76,975	2,016,149
Bone and bone dust	823	16,033	2,716	62,669
Kainit	.....	.....	404	2,357
Manure salt	.....	.....	5,000	42,830
Muriate of potash	.....	.....	9,121	341,147
Sulphate of ammonia	.....	.....	1,416	58,393
All other fertilizers	.....	48,716	.....	90,241
Pyrites	221,400	1,368,988	186,647	1,036,724
Totals	329,080	$4,032,904	288,216	$4,005,484

CHICAGO FERTILIZER MARKET IN 1916 SHOWS REMARKABLE RANGE OF PRICES

Western ammoniates have surely had a most amazing course during the year 1916. They had what was promised to be a disastrous slump early in the year, only to recover and reach the highest price in the history of the industry in December. Prices are still going up and goods are becoming scarcer as time goes on. It is expected that Western ammoniates will not have reached their highest price until April, 1917.

Tracing the course of Western ammoniates we find a general weakening in January, 1916. The early strength of cotton had not continued and the South was left with vast quantities still unsold. This condition of affairs did not give much promise of a large sale of mixed fertilizers in the South. The manufacturers that have purchased their requirements earlier in the season recognized this and put vast quantities out on the market for resale. These offerings coupled with those made by the packers glutted the market. There was a weak inquiry from the South and this was generally filled by resale lots which were obtainable at a shade less than the market. The Southern manufacturers quoted 10 to 15 cents per unit of ammonia less than the packers. The Chicago packers did not willingly lower their prices to meet this reselling competition. They thought that the resale lots would soon be absorbed and then the late demand from the small mixers would enable the packers to unload their accumulations at a high price. Later in the month when more and more Southern manufacturers began to let go of their holdings the packers were forced to lower their prices and the market took on a general downward trend which continued till July.

Tankage Showed Early Decline.

January tankage showed a net loss of 5 cents per unit, as it receded from $2.90 to $2.85. Blood slumped from $3.10 to $2.95. February saw a continued recession and the end of the month found tankage selling at $2.80 and 10, while blood brought $2.90. The surprise of the market was the gradual decline of prices when a disastrous break was expected, because of a market where all consuming inquiries had stopped. No new tonnage was going into the South and many Southern manufacturers had accumulations which they could not dispose of. Who was taking the very appreciable tonnage that had been removed from the market? The answer is the animal food industry. Live stock of all kinds were having an excellent sale and prices were exceedingly high. Farmers were in a hurry to get their stock, especially hogs, to market and fed animal tankage lavishly. The poor corn crop of 1915 had forced many farmers to send their hogs to the packing centers quicker than they wished to do. This course made a weak market before Christmas, 1915, and a strong one after, when the supply of hogs had diminished alarmingly. Digester tankage was the only feed available and feed manufacturers had a season which was the greatest in the industry and which has continued steadily since. Packers began to show more interest in this industry and we find a vast quantity of ammoniates going into digester tankage. The packers recognized a steadier and higher market for their market and began to cater to it. Some packers took this opportunity to establish themselves in this business and have gradually eliminated themselves as fertilizer ammoniate sellers. Thus in the last year the fertilizer industry has lost a vast tonnage of ammoniates. The feed manufacturers furnish a readier and more profitable market and is rapidly taking from the fertilizer industry a large part of the ammoniates produced in the United States. These conditions made for a more steady decline in place of the precipitant decline that would have seemed natural.

The gradual decline continued in March and H. G. tankage dropped 2½ to 5 cents per unit, while blood receded 5 cents. The usual late buying rush of the small Southern mixers did not materialize and there was nothing seemingly to keep the ammoniate market from dropping much lower.

Net Losses in April.

The net loss in April was 10 cents per unit on tankage and 7½ cents per unit on blood. There was experienced at this time an excellent demand from California and the Northern States. These sections drew abnormally large quantities from the market and they kept a semblance of stability about a market which had apparently had its chief consumers eliminated. All this time animal food manufacturers were steadily buying.

The recession continued in May. Tankage declined 5 cents per unit more and blood 7½ cents per unit. The demand from Ohio and Indiana continued very good and prices were lowered only slowly.

During June H. G. tankage dropped from $2.60 to $2.50 per unit while H. G. blood "eased off" from $2.70 to $2.60 per unit of ammonia. The Chicago fertilizer interests began now to recognize that ammoniates had reached as low a level as they would see that year. Great weight was brought to bear on the Southern manufacturers to buy future shipments, but sales were very light. The Southern manufacturers preferred to watch the course of the cotton market before buying anything.

July's market was practically the same as June's. There was a trade noted on a basis of $2.42½ and 10 on tankage. Blood's lowest level was $2.60. Toward the end of the month ammoniates began to give indications of an advance and pressure was again put on Southern manufacturers to buy, but with little success.

Advance Began in August.

The advance commenced in August. The demand for animal food continued so good that very little tankage had been carried over. When fertilizer manufacturers, especially those situated on the Atlantic seaboard, began to buy the packers did not hesitate to raise the prices. This rise has continued steadily. The advance which began in August can be attributed to a number of causes. There was at this time the beginning of a scarcity of labor in this section. Packers were reluctant to take on any more business than they were sure they could load out. Imports for about one year had been very small and the usual summer importations were not forthcoming. Cottonseed meal was bringing exceptionally high prices and this practically eliminated itself as a fertilizer proposition. The usual competition with cottonseed meal was lessened and packers thus had another obstacle in the way of high prices removed. The fish catch on the seacoast was very disappointing and indications that the fish scrap production would be far below usual. The exceptional high value of all food crops indicated that they would be extensively fertilized the coming season. Cotton now began to advance steadily. All these reasons for a stronger ammoniate market were seized upon by the packers who systematically raised the prices. H. G. tankage showed a net gain of 20 cents per unit, advancing from $2.55 to $2.75 per unit. H. G. blood advanced to $2.90 from $2.70 per unit of ammonia.

September witnessed a further increase. Tankage gained 20c per unit and blood 15c per unit. The highest quotations for the month were on a basis of $2.95@10 for tankage and $3.15 for blood. Future quotations were hard to get and prompt shipment was not offered as freely as might be expected. As cotton continued its rise prospects for a large fertilizer sale looked bright. There appeared at this time many prophets who freely predicted that 1917 would see a fertilizer market in which ammoniates would sell at 25c. to $1 per unit higher than their previous highest prices.

General Increase in October.

October fell in line with the general increase. The upward march of ammoniates was steady and fast. The demand continued so very good for ammoniates that stocks began to thin out quickly. The unground and crushed tankage found a very ready market, as buyers were not slow to see that ammoniates of every kind were going to be unprecedently scarce. Trading was steady, although many Southern manufacturers did not yet realize that ammoniates would not suffer a relapse. They believed the advance was artificial and not founded on the law of supply and demand; therefore they thought the market would break. The high price on tankage in October was $3.35@10 with the low price at $2.95@10, while blood at the high prices brought $3.50 and at low prices $3.15.

November saw a continuance of the rise. The packers had assumed the method of quoting one day and retiring from the market the next. They stated that they were oversold in some cases. Crushed and unground tankage had advanced in leaps and bounds and the fertilizer business saw crushed tankage selling in some instances at prices in advance of regular high grade ground tankage. This is another record step by ammoniates this season. Future quotations were very few, as packers felt that the rise of ammoniates would be higher per unit than the customary 5c increase which is charged for deferred shipment. They therefore decided to sell mostly for prompt shipment. Prices on tankage ranged from a low of $3.35@10 to a high of $3.70@10, while blood moved between $3.50 and $3.80.

Stronger Condition of New Year's

December's quotations show a steady increase in price, refined tankage and blood going steadily up in price. The cotton market had softened a little, but this had no appreciable effect on the ammoniate market. This was due to the fact that more and more tankage was going into hog tankage. The stocks of ammoniates were also light and buying inquiries, although steady, were not coming in in half the volume that was expected at this time. The packers had no reason for lowering their prices, as they knew they could sell all their good in the long run when the inquiries began to appear in volume.

The new year found the ammoniates in their strongest condition. There is hardly enough goods to go around, and indications point to an increase of 25c to 50c per unit of ammonia before the big Spring buying season is over. The ammoniate prices on tankage are now hovering around the $4.00 mark. Tankage is now selling at $3.85@10 with its lowest at $3.70@10; blood's highest price is $3.90 and its lowest is $3.80.

Price Range on High Grade Tankage.

Following is the range of prices by months on high grade ground tankage for the year 1916, with comparisons:

	1916		1915	
	High.	Low.	High.	Low.
Jan...	$2.90 &10	$2.85 &10	$2.45&10	$2.40 &10
Feb...	2.85 &10	2.80 &10	2.45&10	2.40 &10
Mar...	2.80 &10	2.77½&10	2.45&10	2.37½&10
April.	2.67½&10	2.67½&10	2.35&10	2.30 &10
May..	2.65 &10	2.60 &10	2.35&10	2.20 &10
June..	2.60 &10	2.50 &10	2.30&10	2.20 &10
July...	2.50 &10	2.42½&10	2.30&10	2.25 &10
Aug...	2.75 &10	2.55 &10	2.35&10	2.20 &10
Sept...	2.95 &10	2.75 &10	2.40&10	2.15 &10
Oct...	3.35 &10	2.95 &10	3.15&10	2.55 &10
Nov...	3.70 &10	3.35 &10	2.95&10	2.90 &10
Dec...	3.85 &10	3.70 &10	3.00&10	2.90 &10
Year's range.	3.85 &10	2.42½&10	3.15&10	2.15 &10

Price Range on High Grade Blood

Following is the range of prices on high grade ground blood for the year of 1916, with comparisons:—

	1916		1915	
	High.	Low.	High.	Low.
January	$3.10	$2.95	$2.65	$2.60
February	2.95	2.90	2.65	2.60
March	2.90	2.85	2.65	2.57½
April	2.85	2.77½	2.55	2.50
May	2.77½	2.70	2.60	2.40
June	2.70	2.60	2.50	2.40
July	2.70	2.60	2.42½	2.40
August	2.90	2.70	2.40	2.37½
September ...	3.15	3.00	2.47½	2.35
October	3.50	3.15	3.25	2.70
November ...	3.80	3.50	3.12½	3.10
December ...	3.90	3.80	3.12½	3.00
Year's range.	3.90	2.60	3.25	2.35

ATLANTA MARKET REPORTS INCREASED SALE OF MIXED FERTILIZERS IN 1916

With a poor year back of them, the fertilizer material men and manufacturers in this territory are not concerning themselves about the upset milk pan, but are looking forward to a season which even with its somewhat difficult problems promises to be an extraordinarily good one.

High prices of cotton—and they have sold it at figures higher than have prevailed at any time since the Civil war—as well as all other products of the farm—have not only made the farmers prosperous and ready to make every effort for good yields, but have inculcated the usual desire to plant more and more cotton. In spite of the boll weevil which is now over as far as the South Carolina line, and everything else, it looks now as if there will be more cotton planted this year than ever before, all of which means, of course, more fertilizers.

Georgia consumption the past year was just a little bit better than for 1915 in mixed fertilizers, while it was considerably poorer in cottonseed meal, undoubtedly on account of the high prices at the close of the year. Records of the Department of Agriculture indicate the consumption in Georgia in 1916 of 741,347 tons of mixed fertilizers and 110,262 tons of meal, a gain of about 2,400 tons in the former and a loss of nearly 24,000 in the latter.

It will be seen, therefore, that, if anything, the closing year was just a little bit poorer than the one which preceded it. This is just a little more than half of what consumption would have been in normal good price times. Consumption in this State for the last six years as indicated by the records of the Georgia Department of Agriculture is as follows:—

Consumption for Six Years.

	Tons	
	Fertilizers.	C. S. Meal.
1911	1,202,722	129,748
1912	1,103,864	121,236
1913	1,120,693	122,975
1914	1,282,008	148,281
1915	738,962.4	134,017
1916	741,347	110,262

The one difficulty that is confronting the manufacturers now is the high prevailing prices of most materials. While they have laid in quantities of some materials for the new season, they have not supplied themselves with others, but are waiting until they actually need them and in the hope of at least a somewhat lower market.

The Potash Problem.

Of course the problem of the absence of potash is well understood, nor will it be possible to get enough of it to make a complete fertilizer at a price at which the farmer can afford to use it. All sorts of expedients have been adopted for the solution of this problem, among others numerous experiments being made with feldspar and kindred minerals from the mountains of North Georgia and Western North Carolina. It is stated here that a considerable tonnage of this feldspar said to contain approximately 13 per cent. of potash in the insoluble state has been taken by one of the leading fertilizer concerns of the country, and its purpose is to treat it in accordance with recently tested processes in order to make as much of it as possible available as plant food. But it is stated that even if successful in a small way, this plan cannot all at once supply the amount of potash needed, and even if it could the expense of it is heavy.

Consumption of Ground Raw Phosphate Rock.

Another interesting development has been the remarkable growth in the consumption of ground raw phosphate rock. The rock is finely ground and sold at $10 or $12 per ton. The farmer is advised by the manufacturer of this product to use about a ton an acre. This is a development of the European war. When the phosphate people could no longer sell their product in Europe, they had to do something, so they ground it fine and sold it raw. Fertilier manufacturers oppose the use of it, claiming it is a fraud and can do the land no material good. In the face of this the phosphate people have letters from farmers, chemists and others, which would seem to refute that charge. It is admitted the ground rock has very little soluble phosphoric acid, but it is claimed that the entire amount in the powder, put at 32 per cent., gradually becomes available, a little of it from year to year, as it comes into contact with the acids in the soil. State agricultural departments in some instances have been very strict in requiring that the package shall show that the phosphoric acid is "insoluble and unavailable." Nevertheless much of it has been sold and there are instances in which it is declared to have accomplished splendid results.

Various Expedients Adopted.

The fertilizer dealers in this territory are adopting various expedients for overcoming the difficulty growing out of the extreme scarcity and high price of potash. The Southern Fertilizer Association has opened a farmers' bureau of information and assistance here in Atlanta, and has placed in charge the best experts it could secure, in order to solve for them the problems of any farmers who may present them. Soil analyses will be made, and specific information given as to what crops may best be grown on the land in question, and what fertilizers should be used. This is a help the farmers in this section will need now more than ever, and undoubtedly the bureau's services will be in wide and constant demand.

In spite of the talk around the beginning of 1916 about abandoning the use of fertilizers altogether, the trade gradually emerged from a dullness that fell upon it in the close of 1915, and the manufacturers operating in this territory, worked a fairly good season out of it, considering the handicaps under which they labored.

It was in some of the farmers' organizations that the talk was heard about using no fertilizers at all. Of course it was foolish, and those who were indulging in it loudest would have realized it had they stopped to think. As a matter of fact some of these very men were among the largest consumers of fertilizers in the spring season immediately following.

Nevertheless this sort of talk, together with other conditions, put a damper upon the situation from the manufacturer's standpoint, and they went into the season exceedingly slowly. So far as the smaller ones were concerned—the mixers—they did next to nothing. They were afraid of the situation and very few of them tackled it at all.

Material Market Dead in 1916.

Manufacturers who had bought heavily in the fall were somewhat in doubt as to what to do without potash, and when January, 1916, came, the material market was almost at a standstill. The situation, however, was hopeful. The farmers had had a better year than in 1914, and while they had not make much money, they were able to pay their debts. Consequently collections were good and the financial situation seemed generally satisfactory. The chief trouble seemed to

be in the ruling high prices for bag goods, as a result of which consumers held off until the last moment. Cottonseed meal was selling $10 higher than twelve months before and many other materials were up in proportion. There were no signs of abatement in prices; the tendency of the market was rather toward strengthening, and several advances were noted later in the month. This was especially true of nitrate of soda which was in considerable demand by the powder people. Weather conditions were unfavorable for trade which was still further affected by the heavy fall purchases of the manufacturers.

These conditions naturally brought about a decline in the material market toward February. Meal fell off, acid phosphate weakened and later in the month there were other declines which were unchecked even by the small order trading which was then developed. Thus while February brought the anticipated renewed activity, with its occasional sales of tankage, meal, bulk acid and nitrate of soda, the market remained an exceedingly conservative one all along the line. Manufacturers bought in small quantities only and for immediate shipment. They were getting ready to meet a demand which they felt confident would be good in spite of high prices and other adverse conditions. Extensive preparations for farming which were in progress all over Georgia lent considerable encouragement to the trade. Many mules were bought, and the farmers everywhere seemed to be getting ready for a very busy season. Meal showed a further tendency to weaken. Large quantities of 7 per cent. meal were made into cake for export to Europe, but high ocean rates prevented shipment. Farmers were plowing deep with an evident purpose to get all they could out of the land with the minimum application of fertilizers. Notwithstanding this, it was still felt they would use all that could be made.

Georgia Consumption Very Heavy.

By the beginning of March it began to be apparent that the manufacturers had figured rightly, and that fertilizer consumption would be far in excess of that of 1915. Inspection tag sales for January and February indicated a Georgia consumption of fully 60 per cent. more than in the year preceding. A few of the smaller ones began to get busy, mixing acid phosphate with cottonseed meal, a type of fertilizer that was extensively used in the spring. Meal was plentiful but held firmly at the market. As the large manufacturers were pretty well supplied with materials, brokers and dealers reported slow sales of the hand-to-mouth order. Unsettled weather continued to have bad effect on the market, and quotations on materials exhibited a weakening tendency, especially as to blood, tankage, nitrate of soda and acid phosphate. Shippers kept comparatively busy though not crowded, while brokers and dealers in materials were much disappointed over the situation.

When April came the manufacturers began to rejoice in their conservatism. While most of them sold just about as they had planned, if they had gone much deeper they would have been stuck. Small sales of materials, with an occasional carload lot for filling in, kept up until about the middle of the month. Sales of bag goods were slow but steady; the farmers matched their own conservatism with that of the manufacturers. Weather conditions had materially improved and the crop outlook was fine. Preparations were well advanced, and it became apparent that another reason for slow consumption lay in the fact that in practically no instance were fertilizers being used broadcast; planters generally waited and put it in along with the seed with a view to getting the maximum of benefit from high priced goods. Indications of larger consumption early in the year, because of heavier sales of inspection tags, did not pan out. It came about from the fact that the manufacturers got ready for a very early season, when as a matter of fact it developed into an unusually late one, so far as consumption was concerned. They bought their tags as they made up their product, but the sale of it was strung out through April and May.

Mixers Not Strong Factor.

Outside of what little business they did in the mixture of acid phosphate and cottonseed meal, the mixers were practically not a factor at all in the season's business. Prices and conditions did not favor them and they kept away. With the end of April the material business was well over and the summer dullness had set in. The season had been far from satisfactory, from whatever standpoint viewed. In May the market began to get down to a summer basis and nominal quotations. Meal went off to 28$, around which figure, with slight exception, it remained for the summer months. Acid phosphate declined to around $10, or less, and other materials went down in proportion. The fertilizer trade was looking forwar dto and awaiting the Hot Springs meeting in June.

Business was at a standstill and June brought no change. The first sign of activity came following the meeting of the fertilizer men when in the last days of June and early July the trade in bulk acid picked up considerably, and some extensive purchases were made for the new season. Acid phosphate had gone to $14 or more in the height of the preceding season, and now that it was selling at $10 and $9.50, with prospects ahead for a good season it seemed a good time to buy and a good many orders were placed. There was a little strengthening in nitrate of soda owing to scarcity. Otherwise the material market was barren of activity through July. The new crop of cottonseed meal, on a basis of 7 per cent., was quoted at $26.50, the lowest figure of the year, but did not long remain there. It was found that as a result of changes in the mill processes, there would be very little 7½ per cent. meal available, and quotations went to the 7 per cent. basis, remaining there for the rest of the year.

Bulk Acid Sales a Feature.

There was some trading in meal at this time, but the feature until early August was the sales of bulk acid, purchased chiefly by many of the small mixers who bought at the lower prices for future delivery on account of having been badly caught the year before. Early in August the new prices came out for blood and tankage, first quotations being blood, $3.40, and tankage, $3.48 and 10. Middle and latter August brought a flurry in cottonseed meal, with a consequent upward tendency in the price. Low grade or 7 per cent. meal jumped to $28 at the mills and held strong with an upward tendency. The fertilizer trade bought heavily and there were some good sales at the coast. The strengthening cotton market not only indicated a good fertilizer season, but an increased price for seed, and, therefore, for meal. Peculiarly enough bulk acid showed a tendency to decline in spite of the demand, and went down 50 cents a ton in early August, although the trading was good. The new quotations on domestic sulfas the first figure, Atlanta basis. Some small sales of low grade tankage were phate came in latter August, with $2.05 noted.

September brought a peculiar and a more interesting situation. Speculation had boosted the price of meal, even the low grade kind, some $4 a ton or more. There was no blood or high grade tankage offering, no fish guano and the chief activity continued in bulk acid. Manufacturers who had already purchased meal were lucky; now they began to hold off on account of the speculative feature of the market, which was undoubtedly based largely on the scarcity of ammoniates. Later in the month, however, when it began to appear that a fairly good cotton crop had been made at extraordinarily high prices, the situation took on a brighter hue, and trading picked up considerably. There were extensive sales of bulk acid, nitrate of soda and tankage. Large quantities of 6½ and 30 tankage figured in the trading. The continued high prices of meal kept the manufacturers away from that product, although considerable was sold in the country. A little potash made by the Potash Products Company, of Nebraska, was sold in this market, being quickly taken up at $4 and $5 per unit. Although the concern's representatives continued to quote it for sometime at $5 per unit, it was soon exhausted and there was no more to be had.

Abnormal Conditions in October.

Conditions were equally abnormal in October. With the cotton market climbing rapidly toward 20c., manufacturers began to figure on one of the biggest fertilizer seasons ever known. Simultaneously meal began to advance rapidly, because cottonseed had gone to $33 a ton and the mills could scarcely get it at that. Within two weeks meal shot up from $31.50 to $37, and fertilizer manufacturers naturally began to figure on eliminating it entirely in favor of other and cheaper materials. But with blood and tankage practically exhausted it made the situation still more difficult. As cotton continued to advance during October, the situation became more and more encouraging from the manufacturers' viewpoint. Active trading continued in nitrate of soda and acid phosphate, but on account of prevailing high prices there was little doing in the ammoniates.

November brought little change in the material market here, except still more encouraging on account of 20-cent cotton, and still more waiting on account of the continued advances in the prices of the ammoniates. Activity kept up in nitrate of soda and bulk acid kept up, but it was evident the manufacturers proposed to wait as long as possible before paying the extraordinary prices for other materials. Extensive purchases of nitrate of soda were explained by the fact that it would be necessary to make a fast crop of cotton next year to get away from the boll weevil.

Speculation Boosted December Prices.

Speculation in meal had much to do with boosting the price and keeping it up well through December, though the latter part of the month it began to show evidences of weakness, declining from $37 to $36 still for low grade 7 per cent. meal. Nitrate of soda strengthened up, due to demands from the powder people. A new feature was the appearance in this market of small quantities of potash from Japan, both muriate and kainit, which sold at $6 and $7 per unit. All that offered was quickly taken up. The one material that went practically through the year unaffected by conditions was phosphate rock, which without change maintained the price of $1.75 at the Florida mines.

The following table will show the range in prices of meal, bulk acid, sulphate of ammonia and nitrate of soda for all the months of 1916. Cottonseed meal, sulphate of ammonia and bulk acid are quoted basis Atlanta, while nitrate of soda is given basis ex-vessels South Atlantic ports. Where ammonium sulphate has formerly been bought at the ports it was taken chiefly during the last year on the Atlanta basis. The table follows:—

Price Ranges for the Year.

	Cottonseed meal.	Acid phosphate.		Sulphate ammonia.	Nitrate soda.
Jan.	$33.00	$14.00	$13.50	$3.65	$3.32½
Feb.	30.50	13.50	13.00	3.65	3.55
March	30.00	12.50	12.00	3.65	3.40
April	30.00	11.75	11.75	3.65	3.40
May	30.00	10.50	10.50	3.65	3.00
June	28.00	10.50	10.50	*..	3.00
July	†26.50	10.50	9.50	*..	3.12
Aug.	32.50	10.50	9.50	2.65	3.12
Sept.	32.50	12.00	11.00	3.90	3.00
Oct.	37.00	12.00	11.50	3.90	2.90
Nov.	37.00	12.50	12.50	3.90	3.00
Dec.	37.00	12.50	12.50	3.90	3.15

* Nominal. † New crop.

(Note:—The second quotation on acid phosphate is that at the coast as compared with the interior price, which is given first. The highest prevailing price for the month is given in each case. Meal, of course, went through successive stages from the July price to that of August, and from the September price to that of October.)

The animal ammoniates held their own pretty well during the entire year, closing strong and high with the end of 1916. Prices were attributed to their scarcity as compared with the usual supply and a prospective good demand for the coming season. The range of prices from month to month, with blood and tankage quoted basis Atlanta and fish guano basis Savannah or Norfolk, depending on the source of supply, with the month's high price in each case, is given in the ofllowing table:—

	Blood.	Tankage.	Fish guano
January	$3.80	$3.65 & 10	$3.10 & 10
February	3.55	3.50 & 10	3.10 & 10
March	3.20	3.25 & 10	3.35 & 10
April	3.15	3.20 & 10	3.35 & 10
May	3.00	3.10 & 10	3.35 & 10
June	3.00	3.00 & 10	3.10 & 10
July	3.00	3.10 & 10	3.10 & 10
August	3.40	3.48 & 10	3.10 & 10
September ...	3.60	3.60 & 10	*3.05 & 10
October	3.80	3.95 & 10	Nominal
November	4.20	4.20 & 10	Nominal
December	4.20	4.20 & 10	Nominal

* Atlanta.

On account of the extremely small amount of potash coming into the Atlanta territory the past year, it would be practically impossible to present a table showing the monthly quotations. As already noted, these shipments consisted chiefly of the Nebraska potash and a little from Japan, which sold promply at all the way from $4 to $7 per unit.

Cynamid and Pyrites.

Cynamid has been regularly quoted and used to some considerable extent in this market. Quoted at $2.69 at the beginning of the year and on the usual basis as to bags, the new quotation in July was $2.67 for Augusta delivery, plus bags at current prices, with an advance of 2½c. per unit per month for later months. The year closed with the quotation at $2.75.

Pyrites remained uniformly at 15c. per unit of sulphur at the ports, except for latter part of August, September and October, when it advanced to 16c., going back to 15c. for the close of the year.

GROWTH OF DOMESTIC COLOR INDUSTRY A FACTOR IN DYE MARKETS DURING YEAR

Record Imports of Logwood Bring Down Prices From High Levels—Good Early Demand for Wood and Vegetable Dyes—Wave of Speculation in Bichromate Market.

Production of dyes in this country showed a splendid growth during the year. The increase was true not only for the intermediate rates, but also for the finished colors. Producers confined themselves largely to turning out the colors in most common use, but a fairly wide variety was placed on the market. Activity in the explosives industry created an abnormal demand for materials which enter into the manufacture of dyes and colors and no doubt put a check on production of the latter. As indicating the growth of our dye industry it is pointed out that exports for the first eleven months of the year—the latest date for which official figures are available—were valued at $6,537,294, as compared with a valuation of $2,282,113 for exports in the corresponding period of 1915 and $434,632 in 1914. In some cases the high prices prevalent in the latter part of 1915 and the early part of 1916 acted as a stimulus to producers and the number of producers fell off as values for the products declined later in the year. This may be illustrated by the position of aniline oil. Very high prices were obtained for this material early in the year and some companies took up its manufacture with no idea of making this a permanent fixture in their business. As the year advanced prices went to lower levels, and when the margin became too small or was wiped out altogether these producers ceased turning out aniline oil and thus the number of producers, as well as the volume of output, were curtailed. Progress in the production of dyes also was reported in other countries, and advices from Japan in the latter part of the period stated that the growth of dyestuff companies in that country had caused an oversupply of certain selections.

One of the features of the year was the arrival of dyes from Germany through the medium of merchant submarines. The first arrival at the port of Baltimore was heralded as the beginning of regular resumption of shipments from Germany. In reality only small amounts were thus imported and for some reason or other the customs officials saw fit to withhold details covering the kind and amounts of these dyes, with the result that widespread offers were heard of dyes and colors advertised as imported on the submarines, and fancy prices were obtained for products which had been held here by speculators and others.

During 1915 and the early part of 1916 there was an unusually good demand for the wood and vegetable dyes. As the offerings of aniline colors increased the natural dyes became less active and heavy speculative buying in some of these products failed to find the profits which had been expected. Logwood was the material which, perhaps, attracted the largest amount of speculative interest, but the rapid increase in imports weakened the market before the year was half completed and holders of stocks were forced to sacrifice or hold on for an upward turn of the market.

Aniline Dyes.

The largest producers of aniline oil were well sold up on contracts at the beginning f the year, and some consumers were obtaining deliveries at 15c. per pound. Only limited stocks were offered in the spot market and the highest levels of the year were maintained in January and February, when quotations ranged from 90c. to $1.10 per pound. As spot offerings increased, prices gradually declined, but high prices were maintained over the first six monhs. The high prices obtained for this material attracted many producers, and naturally this increased the spot supply. Early in July 55c. per pound was quoted, but values had gone down to 38c. per pound before the close of the month. The market continued to ease off in August and September. Sales were made in October at 25c. per pound, and the lowest level of the year was reached in December, when 20c. per pound was the basis of sales. The drop from $1.10 per pound to 20c. per pound shows to what extent spot offerings had increased, and indicates the degree of growth in domestic production. It is difficult to estimate the total production of the year, as some plants were in operation only a part of the year. At the close of the year there were loose offerings in the spot market which caused a difference in price according to seller, and which had a depressing effect on values. With that exception the position of the market was firm. The reduction in the number of producing plants tended to curtail selling pressure, and as spot supplies were being cleaned up the indications were favorable for a steadier if not a higher market. Export inquiry for aniline oil was prominent at times, and in many cases lower prices were quoted for export than could be obtained by domestic buyers.

Bichromates.

Record price levels were reached by bichromate of soda during the year. Following their custom many large consumers had placed contracts late in 1915 covering monthly deliveries over 1916. In this way a large percentage of the supply was sold ahead. Export inquiry was heavier than usual and spot offerings were reduced to small proportions in the first quarter of the year.

At the beginning of the year the quotations of sellers ranged from 20c. to 25c. per pound and applied both to spot transactions and to contracts. The course of prices from that time to well along in April was upwards. In March some sellers were quoting 75c. per pound for spot goods, but this was merely a nominal figure, since much favorable prices were named in other quarters. From 55c. to 60c. per pound, however, was a trading basis. The rapid advance in prices, combined with a good consuming demand from foreign markets, attracted heavy buying, some of which was for speculative account. In April and May there came a break in prices. This was started by the offering in the open market of stocks which had been sold for export, but for which no cargo room could be found. These forced sales weakened prices and caused speculative holdings to appear in larger quantities. Under selling pressure prices declined until the 30c. per pound level was reached in June. July brought further declines, with sales made as low as 25c. per pound. A fairly steady market ruled in August and September, but weakness again developed before the close of October, when 23c. per pound became the quotation, and from then until the end of the year prices failed to improve, and in December sales were reported as low as 19c. per pound, with the market weak.

During the latter part of the year some sellers were credited with selling the market short in anticipation of lower prices to follow. Reports were heard about a greatly enlarged output, due to the entrance of new producers, and this further added to the bearish sentiment. The effect of new producers, however, seems to have been overestimated. As far as can be learned, one company actually began the manufacture of bichromate of soda during the year and offered limited amounts to the consuming trade. One of the largest consumers also provided for its own wants by turning out this material. With these exceptions the source of supply remained the same as it was in 1915.

While the spot market for bichromate of soda was at high levels throughout the year, and especially so

HOW REPRESENTATIVE MEN IN REPORTER INDUSTRIES SUMMARIZE 1916.

(*For Additional Outlook and Retrospect Letters See Page 4.*)

J. R. JOHNSTON

President of the Johnston Brokerage Company, Pittsburgh, Pa.

A recapitulation of the operating year from October, 1915, to June, 1916, shows the output of window glass to have been approximately 9,500,000 boxes, every box of which was sold and by September, 1916, there was a scarcity of popular sizes. This was a record in the United States. The normal production of window glass for several years past has been about 7,000,000 boxes, hence the manufacturing year showed an increase of about one-third. Shipments to foreign countries aggregated 1,500,000 boxes. The prices were satisfactory and profitable and the past four years have been pleasing from the point of view of the industry.

With all stocks practically exhausted the outlook for another prosperous year is excellent, and the future—for twelve months at least—is secure. Because of higher wages, increased cost of materials and added expense in securing fuel window glass has advanced in price, but it is still the cheapest commodity of its kind that enters into building construction.

At the commencement of the manufacturing year practically every plant, hand and machine operated, started off under excellent conditions, but within the past month a complication of difficulties have confronted the manufacturers that have never been encountered before. In the important gas fields, plants have been crippled by shortage of natural gas which to a large extent, during cold weather, interfered with continuous operation. The difficulty in securing materials, through uncertain transportation service, has increased the cost of manufacturing and added troubles to the industry, and the embargoes that followed the handling of the finished product have added to the trouble and annoyance. These things may seriously cripple the industry, as they have already greatly curtailed the output, and it is a question if relief can be secured during the winter months.

This may have an effect on the market that will mean further advances, even if not ending in a shortage that will affect building operations. Glass during 1917, therefore, may be expected to sell at higher prices.

Very few changes have been made in methods of manufacturing, aside from a few hand operated plants taking up mechanical methods, and while various devices are being experimented with there is nothing in sight that is likely to bring about any great change in the industry.

Concerning the foreign trade, it is estimated that it is somewhat less than a year ago; one of the reasons being the lack of ocean transportation, but as the manufacturers are confronted with considerable curtailment, the domestic trade will absorb every box of glass that is produced during the manufacturing year ending in mid-summer.

N. OWITZ

Sales Manager J. P. Devine Company, Buffalo, N. Y.

Nineteen hundred and sixteen can go down on record as one of the greatest years in the history of the chemical industry in the world. America has been made independent of any foreign country for its supply of chemicals, colors, dyestuffs and intermediates, and this should be indeed most gratifying to know.

The American manufacturers of chemical apparatus have made this possible, and while we are trying to be modest, still it is necessary for us to fill our chests with pride, and say that the J. P. Devine Company has been the concern instrumental in making America independent.

Since the outbreak of the war, and the cutting off of the supplies of chemicals and dyestuffs, and the demand of American manufacturers increasing, it was absolutely necessary for some one to jump in, take the lead and supply the American manufacturers with the products they needed so badly. The J. P. Devine Company did this to the end that there is now installed and in daily successful operation in the United States, plants that are producing almost every color, chemical and dyestuff that heretofore came from abroad. That is what has been done in 1916.

What we expect to do in 1917 is to further strengthen the amounts of the products that will be manufactured. While almost all of the materials are now being turned out, they are not being turned out in such amounts as will take care of America's needs. We feel our efforts will be given toward supplying additional plants, so that the ultimate capacity of same will be such as will take care of the demand for materials so badly needed.

You as a journal have done your share toward making this condition a reality, for it was through the hearty co-operation of the manufacturers of chemical apparatus and the concerns who needed the equipment to turn out their commodities, by the publication of matters that were interesting to both sources, that you made each of them realize how dependent they were on the other—not only through advertising, but through various propaganda work that you and the other technical papers have done, which is indeed gratifying.

A. F. KITCHEL

Binney & Smith Company, New York City.

The various grades of carbon black have been firm during the past year, due to the fact that the demand has been steady while production has been curtailed, owing to lack of raw material in many sections. This has advanced the price on most of the grades of material, but the majority of the trade have been covered by contract under which they have obtained their regular supply.

It is difficult to forecast the future on account of the impossibility of prophesying definitely what supplies of raw material can be obtained, but from new construction work which has been started we believe that a more normal basis should be reached during the present year. We desire to state that this company is doing everything in its power to make the situation easier and we are in hopes that there will be a sufficient supply of the different grades of black to meet the future demand.

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in the first half of the period, there was a large amount of material delivered on contracts which had been placed in the latter part of 1915 at relatively low prices. Hence many consumers were independent of spot prices and, judging from the prices quoted for 1917 contracts, they will pay more for supplies this year than they did in 1916.

A rather inconsistent position of the market in the latter part of the year was found in the discrepancy between spot and contract prices. The latter did not go below 20c. per pound in many cases, with the majority of contracts placed around 25c. per pound. In other words, the spot price was lower than the contract price. This can be accounted for by the fact that low-priced stocks were being delivered on contract and also that all these sales did not indicate profits to sellers. The following table shows the contract prices in effect in the latter part of 1916, the high and low spot prices for the year and comparisons for the preceding year:—

	Cents		
	Contract prices.	High spot price.	Low spot price.
1916	18 @25	60	19
1915	6¼@18	25	4⅜

Bichromate of potash, though not traded in as extensively as bichromate of soda, was subjected to similar influences. Prices opened the year at 45@46c. per pound and steadily gained in value until 73@75c. per pound was quoted in March. Prices then started downwards and at the end of June offerings were on the market at 40c. per pound. During the second half of the year demand was quiet and price fluctuations were comparatively narrow, with 39@43c. per pound covering the asking prices.

Gambier.

The shipping situation was a factor of importance in the market for gambier. This was true of practically all goods which are imported, as tonnage was scarce and freight charges were abnormally high. The year opened with gambier in very small supply. Arrivals in the latter part of 1915 were limited, and the scarcity of spot offerings had put prices up to very high levels. This was the situation at the beginning of 1916, and asking prices for common gambier were 16@18c. per pound, with the market nominal as far as most sellers were concerned. There was very little change in prices for the first quarter of the year. Most of the material coming in was sold ahead, and while this served to relieve consuming needs it kept the spot market poorly supplied. In June offerings became more free, and sales were made at 12@13c. per pound. These prices held also through July, with another lowering in values in August the 9½c. per pound level was reached. While this figure might have been shaded in some quarters, it was the low quotation of the year, as 10@11c. per pound was the range in the closing months of the year. Shipments of gambier from Singapore were considerably larger than in 1915, and imports into this country during the year also showed an increase. Demand was on a par with supply and stocks in store at the end of the year were light.

Indigo.

The indigo market was featured by large offerings of synthetic grades, and the good demand which sprang up for this material. Stocks of synthetic indigo were found in China and were imported ino this country, coming largely to the New York and Boston markets. In January quotations of $1.25@1.40 per pound were heard for 20 per cent. paste. Buyers were interested at those figures and the market gained in strength as reports were circulated that the supply was giving out. Prices then went to $1.90@2, and in the latter part of March the market was in a nominal position, with offerings scarce. Prices then became irregular, as quotations were made on specific lots, and were subject to previous, so that for the greater part of the year there were no well accepted quotations. Demand for natural indigo of all grades was good, and prices were established according to grade. A quotation of $1.50@5 per pound covers the prices asked. Imports of indigo were larger than last year, though the totals fell far short of those for 1914. In the latter part of the year advices from abroad were received giving an estimate of the area planted to indigo in India, together with the yield. The estimate shows the following:—

	Area		Yield	
Province—	1916-17. Acres.	1915-16. Acres.	1916-17 Cwts.	1915-16. Cwts.
Bihar & Orissa	76,500	60,800	10,800	7,300
Madras	344,300	126,000	40,800	24,000
Punjab	44,900	18,500	7,000	1,800
Un. Provinces	150,300	46,500	16,000	4,000
Bombay & Sind (incl. native States)	7,700	4,700	1,200	1,200
Bengal	2,200	1,600	200	200
Totals	625,900	258,100	75,200	38,500

Logwood.

Official figures showing imports of logwood into this country for the first eleven months of the year offer the following comparisons:

	Tons.	Value.
1916	178,796	$5,807,280
1915	53,513	724,596
1914	32,430	410,490

These figures explain succintly what happened in the market. They show that there was a large increase in imports at unusually high costs per ton. When it is stated that the bulk of these imports came in during the first half of the year, the position of the marke will be more readily understood. The conclusion is that imports were too large to be absorbed, and accumulated stocks put a check on imports for the second half of the year.

Consuming demand for logwood and its derivatives was heavy in the latter part of 1915 and in the early part of 1916. Under increased demand prices began to soar, and reports of remarkable profits in logwood caused numerous parties, either companies or individuals, to bring stocks to this country. The result was that the supply far overshadowed the demand, and prices which had been inflated by excessive buying broke sharply when holders started to unload.

The asking prices for logwood at the beginning of the year ranged from $35 to $45 per ton. In a short time prices were moved up to $80@100 per ton, and sales are said to have been made as high as $110 per ton before the close of the first quarter of the year. Under larger offerings prices eased off, and at the end of the first six months $55@60 per ton was quoted. In the latter half of the year the prices were still lower, and in the fall surpus stocks were offered at private terms, with sales made considerably under the open market price. Some material which cost around $75 per ton to import was sold as low as $21 per ton. At the close of the year selling offers were less pressing, and as ocean freights were high the shipment market was steadied, and this helped to stiffen spot values which were given at $25@35 per ton, according to grade.

Taking 51 degree twaddle as a basis, prices for logwood extract showed a wide range during the year. Early in the period 70@90c. per pound was quoted. From this point there was a decline and at the end of June the price had receded to 35@40c. per pound. These prices gave way gradually in the second half of the year, and in December the market was weak, with demand quiet and offers comparatively large. Quotations were 15@20c. per pound at the close of the year, with the range depending on grade and seller.

Prussiates.

Yellow prussiate of soda was in a very strong position at the beginning of the year. Stocks had been well depleted and the high prices asked for prussiate of potash had widened the outlet for the soda product. Sellers were offering at 68@70c. per pound in January, but with first hands out of the market the price rapidly went up to 90c. per pound. With nothing in sight to increase supplies, the tendency to advance was unchecked over the first half of the year, with quotations ranging from $1.17@1.27 per pound from March to June. The second half of the year found an easier market. Domestic producers were able to offer more freely, and as consumers began to receive deliveries against contracts interest in the spot market lessened and values went down rapidly. From July to August prices dropped from 90c. per pound to 70c. per pound, and in September the 50c. level was reached. With scarcely any recovery in prices, the market dropped steadily until offers were on the market at 40c. per pound in November and December.

Yellow prussiate of potash fluctuated considerably in price during the year, but the opening price and the closing price were pretty near on a parity, so that net changes for the year were small. The year opened with quotations at 90@92c. per pound. A steady climb upward followed, and by March sellers were quoting $1.70 per pound. The market remained strong over the first six months, and then values receded until 95c.@$1 per pound was quoted, and the latter level was effective at the close of the year.

Red prussiate of potash was so scarce early in the year that no reliable figure can be given as truly representing values. Quotations as high as $4.50 @5.25 per pound were heard in the spring months. In common with the other prussiates values were easier in the latter part of the year, and in December the quotation had gone down to $2.50@3 per pound. To a more or less extent quotations on red prussiate were nominal at all times, as sellers were not offering freely, and inquiry for round lots was sufficient to disturb the market and cause instant revisions in asking prices.

Starch.

Export demand for starch was unusually large during the year, and shipments abroad were far in excess of preceding years. Another feature of the year was the strength in the raw material which developed in the latter part of the year. In the early months of the year prices moved within a narrow range. Opening quotations were: $2.15 in bags, $2.26 in barrels, for pearl starch; $2.20 in bags, $2.31 in barrels, for powdered starch; $2.33 in bags, $2.44 in barrels, for cornstarch; $2.35 in bags, for finishing starch.

With strong export buying and fair domestic consumption prices started to climb up in the early summer, and as raw material steadily went up in price the result was seen in a similar course for the products. The high point was reached early in December, when a new price schedule went into effect and remained effective for the rest of the year. This schedule was as follows: Pearl starch, $3.15 in bags and $3.24 in barrels; Buffalo pearl starch, $3.18 in bags and $3.27 in barrels; powdered starch, $3.20 in bags, $3.29 in barrels; Buffalo corn starch, $3.23 in bags, $3.32 in barrels; special warp sizing starch, $3.25 in bags; Hudson River conf. T. B. starch, $3.75 in bags, $3.88 in barrels; finishing starch, $3.55 in bags; crystal T. B. starch, No. 90 fluidity, $3.85 in bags, $3.98 in barrels. These prices are per 100 pounds in carload quantities, freight prepaid to New York.

Sumac.

Sicilian grades of sumac were offered at $65 per ton when the year opened. Stocks were well controlled at primary points and high ocean freights added to the cost at delivered points. Values were stronger through the first quarter of the year, and $85 per ton was quoted in April. A good part of the trading was for future shipments and spot stocks were not large at any time. Activity in the trades which are consumers of sumac and sumac extract brought about a good demand for this material, and consumption was reported to have been larger in 1915 or 1914. The price for sumac came down from the high level in the latter part of the year and $73@75 per ton was quoted in October and November, with prices varying from $75 to $78 per ton at the close of the year.

Zinc Dust.

In quoting prices for zinc dust sellers are careful to distinguish between grades, and on that account there has been a range in prices at all times. At the close of last year some sellers were quoting 29c. per pound for zinc dust, but wee able to offer only in a limited way, and second hands really established the market at 35@38c. per pound. This was the level of prices at the opening of 1916. Shortly after the first of the year offerings became more free, and the quotation became 31@35c. per pound, and by June the inside price had been brought down to 28c. per pound. In the latter half of the sellers were quoting on still more favorable terms, and at the close 20@28c. per pound covered the range in asking prices.

IMPORTS ENTERED FOR CONSUMPTION INTO THE UNITED STATES

For the Fiscal Years Ended June 30.

Abrasives, Corundum Grains Manufactured, Ground, Etc.

	Pounds.	Dollars.
1912	657,054	39,931
1913	1,855,400	87,187
1914	1,113,961	61,026
1915	832,900	39,938
1916	663,826	29,471

Abrasives, Crude, Artificial.

		Dollars.
1912	.....	88,550
1913	.....	190,057
1914	.....	235,465
1915	.....	255,474
1916	.....	547,848

Abrasives, Emery Grains Manufactured, Ground, Etc.

	Pounds.	Dollars.
1912	742,300	35,048
1913	886,315	36,908
1914	846,191	33,949
1915	629,802	25,040
1916	458,581	18,497

Abrasives, Emery Wheels, Files, Paper, Etc.

		Dollars.
1912	.....	15,700
1913	.....	15,006
1914	.....	20,505
1915	.....	17,342
1916	.....	35,042

Abrasives, Pumice Stone, Unmanufactured.

	Tons.	Dollars.
1912	5,943	55,019
1913	5,558	44,474
1914	7,065	57,427
1915	6,060	47,469
1916	8,650	69,811

Abrasives, Pumice Stone, Wholly or Partially Manufactured.

	Pounds.	Dollars
1912	6,289,480	29,240
1913	3,845,326	17,417
1914	6,484,875	28,280
1915	6,013,747	27,152
1916	5,616,012	44,186

Acetone.

	Pounds.	Dollars.
1914	2,760	307
1915	235,917	21,103
1916	179,497	14,424

Not stated prior to 1914.

Acetanilid.

	Pounds.	Dollars.
1914	1,090	164
1915	800	389
1916	.....	.....

Not stated prior to 1914.

Acetphenetidin.

	Pounds.	Dollars.
1915	39,990	27,356
1916	203	1,532

Not stated prior to 1915.

Acid, Acetic Anhydrid.

	Pounds.	Dollars.
1912	254,977	44,069
1913	309,643	51,632
1914	150,892	23,240
1915	3,652	1,019
1916	18,177	10,013

Acid, Acetic or Pyroligneous.

	Pounds.	Dollars.
1912	78,331	5,882
1913	39,648	3,036
1914	27,750	1,952
1915	312,850	16,419
1916	504,858	53,909

Acid, Acetylsalicylic.

	Pounds.	Dollars.
1914	22,841	11,873
1915	112,602	53,792
1916	229	311

Not stated prior to 1914.

Acid, Arsenic or Arsenious.

	Pounds.	Dollars.
1912	4,735,260	136,378
1913	5,164,768	203,525
1914	3,034,351	110,179
1915	2,789,531	106,530
1916	2,468,694	104,988

Acid, Benzoic.

	Pounds.	Dollars.
1912	470,005	95,740
1913	863,015	133,887
1914	278,890	51,701
1915	132,666	25,442
1916	25,155	79,856

Acid, Boracic.

	Pounds.	Dollars.
1912	276,496	10,540
1913	362,400	13,897
1914	527,201	22,390
1915	401,684	18,002
1916	424,219	22,145

Acid, Carbolic.

	Pounds	Dollars.
1912	5,686,704	521,457
1913	8,345,631	688,771
1914	8,393,216	531,535
1915	3,106,445	179,685
1916	2,246,256	154,841

Acid, Chromic.

	Pounds.	Dollars.
1912	7,869	1,407
1913	8,522	1,682
1914	7,778	1,220
1915	6,505	1,394
1916	.....	.....

Acid, Citric.

	Pounds.	Dollars.
1912	67,332	20,275
1913	8,677	2,416
1914	652,210	204,347
1915	722,434	447,131
1916	171,877	107,603

Acid, Fluoric and Hydrofluoric.

	Pounds.	Dollars.
1912	1,117	57
1913	12	6
1914	305	22
1915	150	11
1916	17	33

Acid, Formic.

	Pounds.	Dollars.
1912	678,524	30,674
1913	502,685	22,414
1914	1,119,745	48,826
1915	534,895	30,641
1916	131,719	19,627

Acid, Gallic.

	Pounds.	Dollars.
1912	28,917	9,701
1913	51,326	17,086
1914	61,635	20,429
1915	41,558	14,992
1916	5,101	1,965

Acid, Glycerophosphoric, Salts and Compounds.

	Pounds.	Dollars.
1914	24,780	23,066
1915	15,993	17,678
1916	7,668	8,242

Not stated prior to 1914.

Acid, Hydrochloric or Muriatic.

	Pounds.	Dollars.
1912	.....	.....
1913	440	14
1914	254,480	1,450
1915	3,532,076	20,884
1916	4,215,491	27,202

Acid, Lactic.

	Pounds.	Dollars.
1912	335,335	25,267
1913	158,754	19,029
1914	276,237	30,423
1915	143,291	26,787
1916	17,845	10,930

Acid, Nitric.

	Pounds.	Dollars.
1912	264	13
1913	100	8
1914	.....	.....
1915	356,558	17,776
1916	224,099	11,487

Acid, Oxalic.

	Pounds.	Dollars.
1912	7,077,462	351,449
1913	8,046,380	402,960
1914	8,780,857	433,783
1915	4,496,679	262,422
1916	522,549	166,117

Acid, Phosphoric.

	Pounds.	Dollars.
1912	454,962	57,635
1913	504,383	76,907
1914	528,827	63,222
1915	285,193	39,120
1916	71,568	12,937

Acid, Phthalic.

	Pounds.	Dollars.
1912	67,362	16,787
1913	75,696	20,511
1914	63,574	15,597
1915	17,925	4,498
1916	.....	.....

Acid, Picric or Nitro Picric.

	Pounds.	Dollars.
1912	50,061	9,233
1913	85,068	18,339
1914	.....	.....
1915	20,091	4,278
1916	.....	.....

Acid, Pyrogallic.

	Pounds.	Dollars.
1912	28,961	22,804
1913	9,512	9,278
1914	23,615	20,496
1915	10,564	9,514
1916	169	227

Acid, Salicylic.

	Pounds.	Dollars.
1912	28,769	5,840
1913	31,844	6,500
1914	18,821	4,425
1915	82,617	24,408
1916	100	386

Acid, Silicic.

	Pounds.	Dollars.
1912	8,897	507
1913	121,344	6,486
1914	.....	.....
1915	3,086	586
1916	15	6

Acid, Stearic or Stearin.

	Pounds.	Dollars.
1912	67,122	6,762
1913	119,619	12,160
1914	100,088	9,593
1915	32,795	3,465
1916	40,979	6,029

Acid, Sulphuric, or Oil of Vitriol.

	Pounds.	Dollars.
1912	48,846	639
1913	34,624	512
1914	6,725,999	40,559
1915	7,382,139	44,008
1916	6,286,490	61,352

Acid, Tannic or Tannin.

	Pounds.	Dollars.
1912	1,010	484
1913	1,540	768
1914	12,892	4,326
1915	49,493	17,047
1916	2,229	654

Acid, Tartaric.

	Pounds.	Dollars.
1912	105,311	24,116
1913	78,942	15,747
1914	848,575	203,850
1915	820,105	273,880
1916	198,873	84,373

Acid, Valerianic.

	Pounds.	Dollars.
1912	1,041	891
1913	1,019	860
1914	1,161	750
1915	2,163	1,774
1916	600	399

Acids, All Other Not Specially Provided For.

		Dollars.
1912	.....	53,455
1913	.....	86,539
1914	.....	94,078
1915	.....	73,849
1916	.....	36,434

Aconite.

	Pounds.	Dollars.
1912	21,385	1,721
1913	12,946	1,065
1914	4,267	321
1915	8,821	962
1916	6,720	638

Acorns, Raw, but Unground.

	Pounds.	Dollars.
1913	7,165	216
1914	3,613	208
1915	4,395	198
1916	.....	.....

Agar-Agar.

	Pounds.	Dollars.
1914	189,232	54,319
1915	344,119	92,809
1916	332,931	110,410

Not stated prior to 1914.

Albumen, Blood.

	Pounds.	Dollars.
1912	166,482	25,200
1913	177,795	27,847
1914	90,380	13,239

Not stated after 1914.

Albumen, Egg.

	Pounds.	Dollars.
1912	1,040,750	329,732
1913	1,246,744	406,594
1914	1,574,271	487,905

Note.—Stated separately after 1914; see following classes.

Albumen, Egg, Dried.

	Pounds.	Dollars.
1915	1,269,398	402,906
1916	1,670,996	751,976

Albumen, Egg, Frozen or Liquid.

	Pounds.	Dollars.
1915	691,081	92,807
1916	1,451,376	201,609

Albumen, Not Otherwise Provided For.

	Pounds.	Dollars.
1912	5,959	1,429
1913	15,831	3,421
1914	382,589	58,175
1915	258,057	48,941
1916	81,787	25,615

Alcohol, Grain.

	Proof gallons.	Dollars.
1912	144,838	22,211
1913	135,250	22,780
1914	109,830	19,365
1915	40,532	5,707
1916	59,198	7,285

Alcohol, Methyl or Wood.

	Gallons.	Dollars.
1912	157	185
1913	362	387
1914	109,022	42,598
1915	39,485	11,880
1916	46,829	9,496

Alizarin, Natural or Artificial, and Dyes Derived Therefrom.

	Pounds.	Dollars.
1912	5,463,096	1,385,529
1913	8,219,087	1,824,973
1914	806,764	246,196
1916	.....	.....

Stated as following class after October 3, 1913.

Alizarin, Natural or Synthetic and Dyes Derived from Alizarin, Anthracen and Carbozol.

	Pounds.	Dollars.
1914	1,828,074	599,648
1915	5,992,878	1,586,367
1916	71,834	44,282

Alum, Alum Cake, Patent Alum, Sulphate of Alumina and Aluminous Cake.

	Pounds.	Dollars.
1912	3,037,190	29,196
1913	4,129,190	39,944
1914	4,119,481	47,759
1915	3,904,561	41,166
1916	2,482,663	45,491

Alumina, Hydrate of, or Refined Bauxite.

	Pounds.	Dollars.
1912	2,307,849	38,204
1913	2,252,156	37,812
1914	1,639,027	26,328
1915	202,968	5,680
1916	418	260

Aluminum, in Crude Form, Scrap and Alloys of Which Aluminum Composes Chief Value.

	Pounds.	Dollars.
1912	14,971,290	1,857,726
1913	26,642,112	4,247,580
1914	16,421,076	2,801,911
1915	13,925,919	2,364,044
1916	8,203,895	1,823,106

Aluminum Leaf.

	100 leaves.	Dollars.
1912	3,700	1,891
1913	3,531	1,811
1914	1,385	141
1915	15,249	1,901
1916	39,920	5,466

Amber, Manufactures of.

		Dollars.
1912	.....	2,569
1913	.....	7,202
1914	.....	9,832
1915	.....	4,516
1916	.....	5,436

Ambergris.

	Ounces.	Dollars.
1912	272	4,624
1913	608	10,944
1914	32	695
1915	1	87
1916	.....	.....

Ammonia, Carbonate of.

	Pounds.	Dollars.
1912	344,143	21,551
1913	258,376	16,173
1914	391,981	25,195
1915	784,821	49,122
1916	357,280	25,018

Ammonia, Liquid Anhydrous.

	Pounds.	Dollars.
1912	20	2
1913	.....	.....
1914	.....	.....
1915	307	35
1916	.....	.....

Ammonia, Muriate of, or Sal Ammoniac.

	Pounds.	Dollars.
1912	12,496,437	589,227
1913	10,687,148	504,330
1914	9,254,539	470,566
1915	4,788,325	241,713
1916	1,985,464	122,174

Ammonia, Nitrate of.

	Tons.	Dollars.
1914	1,383	132,849
1915	1,637	193,907
1916	.....	.....

Not stated prior to 1914.

Ammonia, Perchlorate of.

	Pounds.	Dollars.
1914	70,253	6,337
1915	72,576	6,515
1916	.....	.....

Not stated prior to 1914.

Ammonia, Phosphate of.

	Pounds.	Dollars.
1912	13,894	915
1913	7,433	493
1914	205,764	13,462
1915	71,782	5,394
1916	810	40

Ammonia, Sulphate of.

	Tons.	Dollars.
1912	74,104	4,143,443
1913	61,113	3,060,064
1914	83,597	4,900,058
1915	64,417	3,215,139
1916	19,404	1,371,007

Oil, Aniline.

	Pounds.	Dollars.
1912	1,843,443	175,120
1913	2,015,318	171,047
1914	1,444,772	116,628
1915	1,407,305	240,165
1916	104,836	28,130

Aniline Salts.

	Pounds.	Dollars.
1912	4,831,075	386,656
1913	4,976,108	371,198
1914	3,083,467	222,728
1915	895,439	130,280
1916	16,084	3,978

Annatto, Roucou, Rocoa or Orleans, and All Extracts of.

	Pounds.	Dollars.
1912	936,163	34,921
1913	405,024	19,991
1914	507,250	25,341
1915	809,903	53,174
1916	603,271	69,811

Anthracine and Anthracene Oil.

		Dollars.
1914	.....	32,175
1915	.....	49,949
1916	.....	2,551

Not stated prior to 1914.

Antimony Oxide, Salts and Compounds of.

	Pounds.	Dollars.
1912	1,079,268	46,671
1913	1,819,323	97,447
1914	2,623,084	248,164
1915	1,797,295	219,605
1916	511,848	109,814

Antipyrine.

	Pounds.	Dollars.
1914	7,686	11,608
1915	606	1,085
1916	222	2,202

Not stated prior to 1914.

Antitoxins, Vaccine Virus, and All Other Animal Serums Used for Therapeutic Purposes.

		Dollars.
1912	.....	7,525
1913	.....	5,032
1914	.....	19,019
1915	.....	12,826
1916	.....	8,225

Apatite.

	Tons.	Dollars.
1912	80	1,140
1913	2,930	22,535
1914	92	706
1915	.....	.....
1916	.....	.....

Argols or Crude Tartar, or Wine Lees, Crude.

	Pounds.	Dollars.
1912	23,648,848	2,226,439
1913	29,476,172	2,621,491
1914	5,712,667	545,165

Class dropped under 1913 tariff; see below.

Argols, Partly Refined, or Tartars and Lees Crystals.

	Pounds.	Dollars.
1912	14,502	1,875
1913	5,498	763
1914	.....	.....

Class dropped under 1913 tariff; see below.

Argols, or Crude Tartar or Wine Lees Crude or Partly Refined.

	Pounds.	Dollars.
1914	23,810,048	2,654,618
1915	28,814,957	3,122,326
1916	34,602,184	5,233,516

Arrowroot, Unmanufactured.

	Pounds.	Dollars.
1912	95,714	5,512
1913	11,327	688
1914	8,615	316
1915	134	5
1916	5,987	302

Arsenic, and Sulphide of, or Orpiment.

	Pounds.	Dollars.
1912	4,061,055	128,413
1913	8,475,592	254,284
1914	4,148,928	169,614
1915	3,981,661	178,756
1916	2,794,254	122,795

Articles Manufactured in the United States Returned — Quicksilver Flasks or Bottles, and Drums Used in Exporting Acids.

		Dollars.
1912	.....	205,931
1913	.....	259,123
1914	.....	280,620
1915	.....	180,676
1916	.....	204,642

Artists' Colors, in Tubes, Pans, Cakes, Etc.

		Dollars.
1912	.....	104,940
1913	.....	136,894
1914	.....	211,305
1915	.....	186,728
1916	.....	129,653

Ashes, Wood and Lye of, and Beet Root Ashes.

		Dollars.
1912	.....	40,212
1913	.....	36,493
1914	.....	27,884
1915	.....	41,522
1916	.....	43,839

Asphaltum and Bitumen, Crude, Except Limestone Rock Asphalt.

	Tons.	Dollars.
1912	154,508	587,252
1913	188,725	750,685
1914	45,876	171,981
1915	79,561	465,717
1916	130,039	700,940

Aspirin.

	Pounds.	Dollars.
1914	25	25
1915	41	37
1916	105	176

Not stated prior to 1914.

Balsam Copaiba, Crude.

	Pounds.	Dollars.
1912	159,172	50,969
1913	206,447	66,361
1914	245,435	71,339
1915	273,616	69,921
1916	204,464	70,868

Balsam Fir, or Canada, Crude.

	Pounds.	Dollars.
1912	3,741	1,741
1913	3,691	1,827
1914	13,864	12,505
1915	18,610	14,636
1916	7,113	3,934

Balsam Peru, Crude.

	Pounds.	Dollars.
1912	47,862	63,800
1913	48,996	61,702
1914	27,021	29,704
1915	27,506	32,735
1916	40,657	112,270

Balsam Storax, or Styrax, Crude.

	Pounds.	Dollars.
1912	19,139	2,325
1913	35,861	5,223
1914	5,607	798
1915	11,445	1,550
1916	11,696	5,528

Balsam Tolu, Crude.

	Pounds.	Dollars.
1912	30,970	7,256
1913	57,277	29,552
1914	42,138	19,063
1915	39,750	13,993
1916	63,579	17,233

Balsam, All Other Crude.

	Pounds.	Dollars.
1912	30,391	12,885
1913	46,000	12,149
1914	53,311	12,410
1915	5,999	4,214
1916	2,503	1,312

Balsams, Advanced in Value by Any Process, Copaiba.

	Pounds.	Dollars.
1914	.....	.....
1915	74	18
1916	.....	.....

Not stated prior to 1914.

Balsams, Advanced in Value by Any Process, Fir or Canada.

	Pounds.	Dollars.
1914	.....	.....
1915	205	154
1916	10	18

Not stated prior to 1914.

Balsams, Advanced in Value by Any Process, Tolu.

	Pounds.	Dollars.
1914	1,270	622
1915	.....	.....
1916	.....	.....

Not stated prior to 1914.

Balsams, Advanced in Value by Any Process, All Other.

	Pounds.	Dollars.
1914	.....	.....
1915	15	3
1916	.....	.....

Not stated prior to 1914.

Barium, Carbonate of, Precipitated.

	Pounds.	Dollars.
1912	946,971	7,376
1913	22,182,517	20,143
1914	4,995,451	46,425
1915	344,588	7,864
1916	6	2

Barium, Chloride of.

	Pounds.	Dollars.
1912	2,834,980	27,766
1913	2,926,159	26,741
1914	6,110,386	64,563
1915	4,686,029	60,532
1916	50	10

Barium, Dioxide (Binoxide) of.

	Pounds.	Dollars.
1912	3,715,823	255,053
1913	3,507,508	215,500
1914	6,085,798	329,139
1915	4,084,144	317,262
1916	546,442	48,451

Bark, Cinchona or Other from Which Quinine May Be Extracted.

	Pounds.	Dollars.
1912	2,935,350	239,182
1913	3,329,973	354,593
1914	3,654,968	464,411
1915	3,951,196	561,802
1916	3,967,320	777,637

Bark, Hemlock.

	Cords.	Dollars.
1912	5,633	34,427
1913	5,502	31,965
1914	4,483	25,655
1915	3,672	19,967
1916	3,388	17,855

Baryta, Sulphate of, or Barytes, Unmanufactured.

	Tons.	Dollars.
1912	20,988	40,941
1913	28,358	63,345
1914	32,550	63,270
1915	9,616	21,087
1916	15	245

Baryta, Sulphate of, or Barytes, Manufactured.

	Tons.	Dollars.
1912	2,880	21,642
1913	4,594	36,819
1914	5,379	42,627
1915	1,755	14,997
1916	.....	2

Bauxite, Crude.

	Tons.	Dollars.
1912	29,198	107,615
1913	30,863	119,848
1914	23,576	86,871
1915	12,870	50,557
1916	3,450	17,194

Bay Rum, or Bay Water.

	Proof gallons.	Dollars.
1912	376	396
1913	695	707
1914	483	620
1915	503	673
1916	335	341

Beeswax.

	Pounds.	Dollars.
1912	1,077,117	328,752
1913	828,287	254,704
1914	1,412,695	477,745
1915	1,585,338	440,047
1916	2,284,283	618,856

Bismuth.

	Pounds.	Dollars.
1912	166,980	305,282
1913	151,030	257,176
1914	133,190	241,448
1915	34,257	72,587
1916	64,281	155,925

Blanco Polish.

		Dollars.
1912	.....	34,912
1913	.....	21,854
1914	.....	17,997
1915	.....	17,743
1916	.....	21,229

Blanc Fixe, or Artificial Sulphate of Barytes, and Satin White and Artificial Sulphate of Lime.

	Pounds.	Dollars.
1912	5,702,262	70,925
1913	4,808,726	58,499
1914	4,752,474	60,641
1915	2,233,369	25,748
1916	492,723	11,523

Bleacher's Blue.

		Dollars.
1913	.....	8,300
1914	.....	4,143
1915	.....	14,922
1915	.....	14,125
1916	.....	14,922

Not stated prior to 1913.

Bloodchar.

	Pounds.	Dollars.
1912	.....	.....
1913	2,954	333
1914	26,674	1,789
1915	14,167	1,196
1916	15	16

Blood, Dried.

		Dollars.
1912	.....	220,720
1913	.....	86,451
1914	.....	391,947
1915	.....	227,648
1916	.....	196,600

Blue, Berlin, Prussian, Chinese, Etc., in Pulp, Dry or Ground, in or Mixed with Oil or Water.

	Pounds.	Dollars.
1912	137,999	24,606
1913	193,336	34,476
1914	275,174	50,149
1915	547,299	112,904
1916	185,294	110,901

Bone Black, Lamp Black, Etc.

		Dollars.
1912	.....	22,544
1913	.....	31,056
1914	.....	27,604
1915	.....	24,459
1916	.....	2,396

Bone Char, or Bone Black, Not Suitable for Use as Pigment.

		Dollars.
1912	.....	20,414
1913	.....	12,484
1914	.....	77,717
1915	.....	120,715
1916	.....	86,724

Bones, Crude.

		Dollars.
1912	.....	682,866
1913	.....	565,566
1914	.....	829,730
1915	.....	756,015
1916	.....	755,700

Bone and Horn, Manufactures of.

		Dollars.
1912	.....	78,648
1913	.....	95,913
1914	.....	81,666
1915	.....	63,463
1916	.....	59,846

Bone Dust, or Animal Carbon and Ash, Fit Only for Fertilizer.

	Tons.	Dollars.
1912	36,534	913,023
1913	33,919	818,307
1914	41,446	1,036,493
1915	23,440	584,748
1916	20,595	527,079

Borax.

	Pounds.	Dollars.
1912	6,409	604
1913	11,768	882
1914	686	93
1915	.....	.....
1916	.....	.....

Bottle Caps, Collapsible Tubes and Sprinkler Tops, Not Decorated, Etc.

		Dollars.
1912	.....	34,385
1913	.....	24,123
1914	.....	50,425
1915	.....	28,420
1916	.....	15,166

Bottle Caps, Collapsible Tubes and Sprinkler Tops, Decorated, Etc.

		Dollars.
1912	.....	214,250
1913	.....	203,357
1914	.....	547,034
1915	.....	214,522
1916	.....	178,081

Bristles, Crude, Not Sorted.

	Pounds.	Dollars.
1912	26,367	14,813
1913	18,913	15,506
1914	27,636	28,280
1915	45,467	3,336
1916	92,300	15,239

Bristles, Sorted, Bunched, or Prepared.

	Pounds.	Dollars.
1912	3,354,350	2,926,709
1913	3,479,666	3,319,904
1914	3,551,081	3,255,554
1915	3,726,625	3,348,533
1916	3,514,309	3,456,452

Bronze Powder, Brocades, Flitters, and Metallics.

	Pounds.	Dollars.
1912	1,454,154	416,685
1913	1,405,502	420,308
1914	1,403,091	406,249
1915	1,063,206	288,054
1916	161,409	96,852

Brown, Spanish, Indian Red, and Colcothar, or Oxide of Iron.

		Dollars.
1912	.....	99,106
1913	.....	103,604
1914	.....	186,476
1915	.....	183,033
1916	.....	221,209

Brown, Vandyke, Cassel Earth or Cassel Brown.

		Dollars.
1912	.....	2,635
1913	.....	1,381
1914	.....	2,663
1915	.....	1,497
1916	.....	365

Brushes, Feather Dusters and Hair Pencils.

		Dollars.
1912	.....	2,074,325
1913	.....	2,074,141
*1914	.....	563,160

*Figures cover period from July 1 to October 3, 1913.
Stated separately after October 3, 1913.

Brushes.

		Dollars.
1914	.....	1,605,964
1915	.....	1,667,239
1916	.....	1,309,423

Buchu Leaves.

	Pounds.	Dollars.
1912	181,121	160,608
1913	105,310	114,632
1914	125,368	130,352
1915	120,704	115,689
1916	94,520	85,452

Cadmium.

	Pounds.	Dollars.
1912	6,396	4,603
1913	1,000	1,508
1914	1,543	1,239
1915	264	278
1916	5	6

Caffeine.

	Pounds.	Dollars.
1912	43,859	139,067
1913	59,773	211,361
1914	80,359	260,323
1915	54,323	186,557
1916	1,267	15,228

Caffeine Compounds.

		Dollars.
1914	.....	9,712
1915	.....	4,071
1916	.....	605

Not stated prior to 1914.

Calcium, Acetate, Chloride, Carbide and Nitrate.

		Dollars.
1914	.....	53,455
1915	.....	1,208,394
1916	.....	3,206,369

Not stated prior to 1914.

Calcium Cyanamid or Lime Nitrogen

	Tons.	Dollars.
1912	7,134	387,210
1913	14,656	777,774
1914	29,536	1,590,004
1915	20,564	919,574
1916	38,023	1,633,366

Calcium, Tartrate, Crude.

	Pounds.	Dollars.
1914	118,256	8,849
1915	1,755,964	161,566
1916	1,101,255	135,638

Not stated prior to 1914.

Calomel, Corrosive Sublimate and Other Mercurial Medicinal Preparations.

		Dollars.
1912	.....	35,842
1913	.....	42,728
1914	.....	37,589
1915	.....	25,694
1916	.....	13,158

Camomile Flowers.

		Dollars.
1912	.....	17,227
1913	.....	14,176
1914	.....	6,252
1915	.....	13,113
1916	.....	27,810

Camwood.

	Tons.	Dollars.
1912	1½	523
1913	½	191
1914	.....	.....
1915	1	209
1916	80	5,991

Candle Pitch or Tar, and Palm or Other Vegetable Stearin.

	Pounds.	Dollars.
1912	2,780,736	49,332
1913	3,047,020	56,970
1914	2,203,222	40,004
1915	1,262,725	23,400
1916	853,140	21,596

Candles and Tapers, Wax and Other.

		Dollars.
1912	.....	19,178
1913	.....	22,990
1914	.....	14,348
1915	.....	8,638
1916	.....	9,118

Cantharides.

	Pounds.	Dollars.
1912	17,062	8,925
1913	8,788	5,582
1914	5,648	4,435
1915	14,047	12,266
1916	32,603	26,923

Carbon Tetrachloride.

	Pounds.	Dollars.
1914	372,910	28,300
1915	342,854	18,139
1916	.....	.....

Not stated prior to 1914.

Cassia Buds, Unground.

	Pounds.	Dollars.
1912	26,667	3,418
1913	23,367	2,449
1914	173,449	10,101
1915	193,332	10,394
1916	197,056	16,585

Cassia, and Cassia Vera, Unground.

	Pounds.	Dollars.
1912	6,880,723	521,104
1913	7,151,605	547,116
1914	5,216,426	358,218
1915	5,658,154	348,598
1916	7,487,156	493,161

Castor or Castoreum.

	Ounces.	Dollars.
1912	6,332	4,750
1913	9,245	5,384
1914	6,338	3,468
1915	13,036	5,344
1916	19,657	6,694

Castor Beans or Seeds.

	Bushels.	Dollars.
1912	978,258	1,080,620
1913	824,574	918,608
1914	1,043,928	1,154,085
1915	924,605	993,580
1916	1,071,969	1,555,465

Catgut, Whipgut or Wormgut, Unmanufactured.

		Dollars.
1912	.....	131,249
1913	.....	139,125
1914	.....	123,551
1915	.....	198,081
1916	.....	253,678

Catgut, Whipgut or Wormgut, Manufactures of.

		Dollars.
1912	.....	4,878
1913	.....	3,427
1914	.....	62,466
1915	.....	68,492
1916	.....	9,790

Cement, Roman, Portland and Other Hydraulic.

	100 pounds.	Dollars.
1912	449,587	168,718
1913	313,092	124,396
1914	374,471	163,469
1915	342,292	132,864
1916	19,960	9,182

Chalk, Unmanufactured.

	Tons.	Dollars.
1912	151,868	128,190
1913	150,010	120,049
1914	128,947	102,907
1915	120,225	91,188
1916	131,368	95,861

Chalk, When Ground, Precipitated, or Otherwise Prepared, Including Tailor's, Billiard, Red or French.

	Pounds.	Dollars.
1912	3,809,841	88,391
1913	2,536,622	79,731
1914	*	62,656
1915	*	36,621
1916	*	46,135

*Quantity not stated after 1913.

Chamois Skin.

		Dollars.
1912	.....	149,284
1913	.....	149,057
1914	.....	107,324
1915	.....	64,267
1916	.....	108,346

Charcoal.

		Dollars.
1912	.....	31,722
1913	.....	25,557
1914	.....	60,266
1915	.....	39,978
1916	.....	45,174

Chicory Root, Raw but Unground.

	Pounds.	Dollars.
1912	5,401	125
1913	2,203,057	32,939
1914	1,580,925	22,028
1915	471,966	6,717
1916	.....	.....

Chicory Root, Burnt or Roasted, Ground or Granulated.

	Pounds.	Dollars.
1912	633,128	31,532
1913	469,301	19,355
1914	765,056	31,988
1915	409,234	13,991
1916	5,657	260

China Clay, or Kaolin.

	Tons.	Dollars.
1912	237,366	1,541,105
1913	263,838	1,753,822
1914	241,936	1,590,054
1915	230,484	1,506,555
1916	228,936	1,376,990

Chloral, Hydrate.

	Pounds.	Dollars.
1912	.....	.....
1913	.....	.....
1914	644	241
1915	112	25
1916	1	2

Chloroform.

	Pounds.	Dollars.
1912	926	1,541
1913	942	1,643
1914	2,444	990
1915	29	43
1916	.....	.....

2,274 pounds of the 1914 figures were valued at only 25 cents a pound; 170 pounds at $2.48 per pound.

Chlorophyll, Extract of.

	Pounds.	Dollars.
1912	4,461	3,586
1913	7,508	8,544
1914	10,125	8,503
1915	3,490	3,671
1916	190	192

Chrome, Yellow or Green and All Other Chromium Colors.

	Pounds.	Dollars.
1912	161,153	24,731
1913	148,299	23,405
1914	134,460	22,412
1915	124,638	21,171
1916	27,029	5,586

Chromium, Hydroxide, Crude.

		Dollars.
1914	.....	5,859
1915	.....	12,444
1916	.....	.....

Not stated prior to 1914.

Cinchona Bark, Alkaloids or Salts of, All Other, Except Quinia, Sulphate of.

	Ounces.	Dollars.
1912	529,201	91,802
1913	648,865	131,692
1914	452,293	117,915
1915	203,350	66,004
1916	231,100	82,167

Cinchonidia.

	Ounces.	Dollars.
1912	136,197	14,183
1913	909,395	43,680
1914	205,006	19,502
1915	69,487	8,223
1916	131,481	15,814

Cinnamon, and Chips of, Unground.

	Pounds.	Dollars.
1912	1,013,348	109,215
1913	1,405,832	188,267
1914	303,967	44,304
1915	528,254	74,081
1916	410,594	50,026

Civet.

	Ounces.	Dollars.
1912	5,039	6,725
1913	11,269	15,557
1914	2,761	3,978
1915	1,820	2,086
1916	9,000	12,000

Clay, Common Blue and Grass-Almerode for Manufacturing Crucibles and Glass Melting Pots.

	Tons.	Dollars.
1912	16,689	139,688
1913	23,213	211,005
1914	20,587	180,524
1915	12,274	107,146
1916	3,488	16,088

Clay, Plasticene and Other Modeling.

		Dollars.
1912	.....	4,512
1913	.....	5,519
1914	.....	9,424
1915	.....	6,541
1916	.....	7,978

Clays or Earths, Not Specially Provided For.

	Tons.	Dollars.
1912	26,384	120,468
1915	37,370	167,614
1914	37,572	210,574
1915	36,072	153,041
1916	34,077	148,916

Cliffstone, Unmanufactured.

	Tons.	Dollars.
1912	8,522	11,167
1913	5,626	6,164
1914	9,079	11,046
1915	7,428	8,977
1916	7,879	10,795

Cloves, Unground.

	Pounds.	Dollars.
1912	6,414,363	713,230
1913	2,734,992	481,751
1914	5,054,621	597,310
1915	5,346,695	595,546
1916	7,066,237	791,708

Clove Stems, Unground.

	Pounds.	Dollars.
1912	.....	.....
1913	32,830	1,333
1914	268	20
1915	4,591	760
1916	57,160	4,009

Coal-Tar Colors or Dyes Not Specially Provided For.

		Dollars.
1912	.....	6,898,756
1913	.....	6,902,065
1914	.....	7,537,924
1915	.....	5,858,500
1916	.....	2,997,924

Coal-Tar Distillates, Not Medicinal, and Not Colors or Dyes.

		Dollars.
1914	.....	138,636
1915	.....	31,979
1916	.....	358,836

Not stated prior to 1914.

Coal-Tar Preparations Not Colors, Dyes or Medicines, Not Specially Provided For.

		Dollars.
1912	.....	625,666
1913	.....	686,003
1914	.....	162,864

Class dropped after October 3, 1913.

Coal-Tar Products, Not Medicinal, and Not Colors or Dyes, Known as Toluidine, Xylidin, Etc.

		Dollars.
1914	.....	728,536
1915	.....	232,493
1916	.....	128,303

Not stated prior to 1914.

Coal Tar, All Other Products, or Preparations, Not Colors or Dyes.

		Dollars.
1912	.....	945,894
1913	.....	1,274,022
1914	.....	718,536
1915	.....	393,112
1916	.....	80,402

Cobalt and Cobalt Ore and Zaffer.

	Pounds.	Dollars.
1912	884,244	74,586
1913	310,951	30,713
1914	197,099	115,038
1915	24,695	8,225
1916	144,170	186,124

Cobalt, Oxide of.

	Pounds.	Dollars.
1912	22,160	10,822
1913	28,720	14,405
1914	109,584	95,026
1915	109,155	180,087
1916	238,934	228,745

Cocaine Ecgonine, and Salts of.

	Ounces.	Dollars.
1912	2,004	3,499
1913	3,715	4,835
1914	3,291	4,101
1915	179	422
1916	4,275	5,887

Cocculus Indicus.

	Pounds.	Dollars.
1912	.....	.....
1913	.....	.....
1914	4,446	121
1915	9,550	388
1916	.....	.....

Cochineal.

	Pounds.	Dollars.
1912	177,799	55,682
1913	109,089	44,249
1914	138,139	53,260
1915	155,430	38,454
1916	772,416	358,914

Coca Leaves.

	Pounds.	Dollars.
1912	1,179,540	201,950
1913	1,175,780	139,035
1914	711,564	91,384
1915	1,048,312	98,870
1916	947,537	106,627

Cocoa Butter, or Butterine, Refined, Deodorized Cocoanut Oil, and All Substitutes for Cocoa Butter.

	Pounds.	Dollars.
1912	5,852,065	1,552,973
1913	3,634,986	990,568
1914	2,876,967	801,259
1915	126,028	35,863
1916	69,888	15,824

Collodion and Celluloid and All Compounds of Pyroxylin.

		Dollars.
1912	.....	187,772
1913	.....	288,639
1914	.....	583,391
1915	.....	371,714
1916	.....	127,627

Colombo Root.

	Pounds.	Dollars.
1912	8,436	610
1913	27,666	794
1914	4,587	134
1915	8,751	458
1916	48,867	3,442

Coloring for Brandy, Wine, Beer, or Other Liquors.

		Dollars.
1912	.....	3,383
1913	.....	1,926
1914	.....	1,628
1915	.....	842
1916	.....	192

Color Foils.

		Dollars.
1912	.....	13,229
1913	.....	10,925
1914	.....	7,347
1915	.....	2,616
1916	.....	.....

Copperas, or Sulphate of Iron.

	Pounds.	Dollars.
1912	633	12
1913	6,196	174
1914	1,120	18
1915	4,750	95
1916	.....	.....

Copper, Sulphate of, or Blue Vitriol.

	Pounds.	Dollars.
1912	12,112	652
1913	11,051	728
1914	114,730	5,486
1915	45,239	2,166
1916	184,182	17,651

Corks.

	Pounds.	Dollars.
1912	2,360,015	1,909,613
1913	2,511,285	2,187,867

Stated separately after 1913; see below.

Cork Stoppers.

	Pounds.	Dollars.
1914	888,500	728,317
1915	326,887	250,342
1916	269,806	170,746

Cork Disks, Wafers or Washers 3-16 Inch or Less in Thickness.

	Pounds.	Dollars.
1914	2,065,567	1,675,883
1915	1,926,904	1,165,540
1916	905,776	487,588

Corkwood, or Cork Bark, Unmanufactured.

	Pounds.	Dollars.
1912	118,432,300	3,247,666
1913	133,227,878	3,152,070
1914	88,282,529	2,646,018
1915	24,897,803	1,420,581
1916	32,866,700	1,517,366

Cotton Batting.

	Pounds.	Dollars.
1914	42,102	4,378
1915	87,555	8,506
1916	166,169	10,458

Not stated prior to 1914.

Crayons, Including Charcoal Crayons or Fusains.

		Dollars.
1912	.....	9,562
1913	.....	12,925
1914	.....	18,359
1915	.....	15,090
1916	.....	11,535

Cream of Tartar.

	Pounds.	Dollars.
1912	82,980	16,300
1913	66,718	11,797
1914	812,837	156,987
1915	784,858	166,922
1916	38,588	13,479

Crucibles of Stone and Earthenware.

		Dollars.
1914	.....	10,974
1915	.....	6,764
1916	.....	7,641

Not stated prior to 1914.

Cryolite, or Kryolith.

	Tons.	Dollars.
1912	1,999	47,300
1913	2,519	52,440
1914	2,157	47,435
1915	4,569	91,417
1916	3,962	84,497

Cubebs.

	Pounds.	Dollars.
1912	111,358	32,169
1913	166,307	53,663
1914	105,665	32,456
1915	87,538	23,451
1916	89,300	28,566

Cudbear.

	Pounds.	Dollars.
1912	19,920	1,156
1913	27,971	1,765
1914	15,653	1,061
1915	24,827	1,680
1916	55,948	6,512

Curry and Curry Powder.

		Dollars.
1912	.....	10,569
1913	.....	12,087
1914	.....	11,807
1915	.....	9,872
1916	.....	8,969

Cuttlefish Bone.

	Pounds.	Dollars.
1912	284,591	34,891
1913	218,317	30,355
1914	309,540	56,051
1915	282,239	52,041
1916	214,659	36,576

Dandelion Root.

	Pounds.	Dollars.
1912	97,942	7,372
1913	108,434	8,269
1914	109,958	9,389
1915	112,814	12,137
1916	29,378	6,487

Decalcomanias, in Ceramic Colors.

	Pounds.	Dollars.
1912	79,962	133,571
1913	80,094	144,800
1914	45,990	92,528
1915	22,411	62,462
1916	11,170	32,882

Decalcomanias, All Other, Except Toys.

	Pounds.	Dollars.
1912	38,761	38,267
1913	41,370	42,001
1914	132,805	131,494
1915	90,040	87,641
1916	51,840	55,634

Divi Divi.

	Pounds.	Dollars.
1912	221,659	2,807
1913	314,491	4,143
1914	29,032	461
1915	4,513,219	71,367
1916	16,407,455	310,572

Dragon's Blood.

	Pounds.	Dollars.
1912	34,411	9,292
1913	14,553	5,916
1914	26,283	9,407
1915	25,110	8,446
1916	20,218	10,602

Dutch Metal Leaf, Bronze.

	100 leaves.	Dollars.
1912	706,743	87,013
1913	763,071	104,329
1914	792,578	110,316
1915	896,038	110,163
1916	291,396	38,599

Eggs, Dried.

	Pounds.	Dollars.
1912	5,555	2,176
1913	20,284	7,537
1914	38,061	12,640
1915	30,575	10,385
1916	38,993	9,875

Eggs, Frozen or Otherwise, Prepared or Preserved, in Packages.

	Pounds.	Dollars.
1914	2,647,974	305,252
1915	2,815,511	198,654
1916	3,756,188	248,097

Not stated prior to 1914.

Eggs, Yolks of.

	Pounds.	Dollars.
1912	89,744	5,833
1913	227,457	37,027
1914	675,058	168,972
1915	1,382,408	257,607
1916	2,919,019	373,152

Enamel, Fusible and Glass.

		Dollars.
1912	.....	14,904
1913	.....	11,997
1914	.....	18,028
1915	.....	10,975
1916	.....	3,731

Enamel, Glass, White, for Watch and Clock Dials.

		Dollars.
1912	.....	18,601
1913	.....	15,855
1914	.....	13,284
1915	.....	7,331
1916	.....	4,930

Enamel Paints.

	Pounds.	Dollars.
1912	35,467	7,684
1913	59,457	11,877
1914	98,174	17,316
1915	86,078	6,504
1916	54,546	8,987

Ergot.

	Pounds.	Dollars.
1912	207,138	187,500
1913	223,790	208,364
1914	185,704	102,640
1915	141,915	92,450
1916	123,015	73,896

Ether, Amylnitrate.

	Pounds.	Dollars.
1915	4,067	4,444
1916	.....	.....

Not stated prior to 1915.

Ether, Ethyl Chloride.

	Pounds.	Dollars.
1912	8,372	5,187
1913	11,241	7,903
1914	9,014	10,046
1915	.....	.....
1916	2,780	5,193

Ether Fruit, Containing No Alcohol.

	Pounds.	Dollars.
1912	152	201
1913	81½	105
1914	1,331	1,737
1915	117	1,070
1916	.....	.....

Ethers, Containing More Than 10 Per Cent. and Not More Than 50 Per Cent. Alcohol.

	Pounds.	Dollars.
1912	.....	5,589
1913	.....	7,020
1914	.....	1,868
1915	66	64
1916	140	169

Quantity not stated prior to 1915.

Ethers, Sulphuric.

	Pounds.	Dollars.
1912	1,455	207
1913	755	129
1914	915	131
1915	840	180
1916	62	23

Ethers, Not Specially Provided For.

	Pounds.	Dollars.
1912	239	127
1913	508	303
1914	12,036	5,049
1915	6,301	4,500
1916	598	1,410

Feather Dusters and Hair Pencils.

		Dollars.
1914	.....	2,401
1915	.....	3,590
1916	.....	3,754

Not separately stated prior to 1914.

Fertilizer, Not Specially Provided For. (Used only for Manure.)

	Tons.	Dollars.
1912	169,293	3,527,646
1913	115,257	2,190,816
1914	197,165	4,241,285
1915	100,155	2,208,193
1916	73,252	1,501,517

Filter Tubes.

		Dollars.
1912	.....	9,348
1913	.....	6,038
1914	.....	7,437
1915	.....	6,630
1916	.....	2,760

Filter Masse or Filter Stock.

	Pounds.	Dollars.
1912	413,556	45,734
1913	429,920	49,042
1914	486,470	53,974
1915	340,498	41,880
1916	54,349	8,356

Flaxseed or Linseed Screenings.

	Pounds.	Dollars.
1914	1,143,420	4,748
1915	229,443	673
1916	.....	4,506

Not separately stated prior to 1914.

Floral Essences Containing No Alcohol.

		Dollars.
1914	.....	87,086
1915	.....	145,973
1916	.....	265,956

Not stated prior to 1914.

Floral or Flower Waters Containing No Alcohol.

		Dollars.
1912	.....	37,187
1913	.....	31,710
1914	.....	50,297
1915	.....	22,216
1916	.....	34,461

Fluorspar.

	Tons.	Dollars.
1912	22,664	62,904
1913	23,780	77,535
1914	13,663	50,943
1915	6,923	27,951
1916	8,808	32,482

Formaldehyde, Solution Containing Not More Than 40 Per Cent. Formaldehyde or Formaline.

	Pounds.	Dollars.
1912	12,303	3,298
1913	.....	.....
1914	14,228	1,443
1915	7,700	814
1916	79,837	8,054

Fuller's Earth.

	Tons.	Dollars.
1911	15,813	125,899
1912	16,175	138,111
1913	16,866	145,588
1914	19,367	174,276

Subdivided after 1914; see below.

Fuller's Earth, Unwrought or Unmanufactured.

	Tons.	Dollars.
1915	745	5,268
1916	1,067	7,825

Fuller's Earth, Wrought or Manufactured.

	Tons.	Dollars.
1915	18,754	163,540
1916	14,973	135,845

Fustic.

	Tons.	Dollars.
1912	3,105	45,833
1913	3,785	53,306
1914	7,121	100,501
1915	12,354	179,959
1916	17,469	289,913

Galalith (Artificial Ivory) and Manufactures of.

		Dollars.
1912	.....	16,860
1913	.....	12,736
1914	.....	15,060
1915	.....	10,048
1916	.....	10,028

Gambier, or Terra Japonica.

	Pounds.	Dollars.
1912	20,886,462	1,029,456
1913	17,037,805	784,951
1914	16,449,663	628,855
1915	14,160,250	542,200
1916	12,602,251	888,985

Gas Liquor, Ammoniacal.

		Dollars.
1912	.....	38,735
1913	.....	35,245
1914	.....	29,356
1915	.....	31,466
1916	.....	26,733

Gelatin.

	Pounds.	Dollars.
1912	701,949	135,593
1913	1,085,940	279,862
1914	2,439,440	768,215
1915	2,708,362	916,369
1916	1,657,065	319,173

Gentian Root.

	Pounds.	Dollars.
1912	1,585,612	67,837
1913	1,796,028	96,281
1914	2,181,935	109,119
1915	1,022,252	55,553
1916	788,307	63,240

Ginger Root, Unground, Not Preserved or Candied.

	Pounds.	Dollars.
1912	5,904,564	568,193
1913	7,856,401	406,197
1914	3,606,132	145,792
1915	3,310,591	156,973
1916	5,530,845	391,965

Glass Bottles, Vials and Jars, Plain Green or Colored, Molded or Pressed, and Flint, Lime, and Lead, Empty.

	Pounds.	Dollars.
1912	.....	206,226
1913	.....	205,267
1914	.....	214,490
1915	3,561,200	83,688
1916	1,351,813	24,049

Quantity not stated prior to 1915.

Glass Demijohns and Carboys, Covered or Uncovered, Empty.

	Pounds.	Dollars.
1912	.....	9,155
1913	.....	6,481
1914	.....	3,899
1915	27,900	800
1916	4,731	298

Quantity not stated prior to 1915.

Glass, Window—Cylinder, Crown, Unpolished.

	Pounds.	Dollars.
1912	23,428,153	827,868
1913	20,458,971	804,732
1914	31,197,531	1,212,536
1915	16,532,210	679,228
1916	1,401,572	140,262

Glass, Window—Cylinder, Crown and Common, Unpolished When Bent or Decorated.

	Pounds.	Dollars.
1912	1,209,505	103,985
1913	1,773,023	153,723
1914	1,706,186	149,263
1915	460,017	56,223
1916	339,009	52,051

Glass, Cylinder and Crown, Unpolished, Silvered.

	Pounds.	Dollars.
1914	56,494	3,993
1915	54,986	2,021
1916	12	1

Not stated prior to 1914.

Glass, Cylinder, and Crown, Polished.

	Sq. feet.	Dollars.
1912	573,995	123,359
1913	579,120	119,396
1914	615,347	121,414
1915	196,274	36,783
1916	108,578	19,893

Glass, Cylinder, and Crown, Polished, When Bent or Decorated.

	Sq. feet.	Dollars.
1912	179,562	43,700
1913	247,428	60,269
1914	147,482	36,116
1915	43,385	10,076
1916	6,321	1,353

Glass, Cylinder, and Crown, Polished, Silvered.

	Sq. feet.	Dollars.
1914	90,657	20,405
1915	89,346	19,597
1916	8,798	1,905

Not stated prior to 1914.

Glass, Window — Cylinder and Crown, Polished, Silvered When Ground, Bent or Decorated.

	Sq. feet.	Dollars.
1912	216	167
1913	17	23
1914	138,158	33,004
1915	107,711	26,235
1916	20,528	5,087

Glass, Plate, Fluted, Rolled, Ribbed, or Rough, or the Same Containing a Wire Netting Within Itself.

	Sq. feet.	Dollars.
1912	311,173	14,514
1913	379,219	14,812
1914	436,587	15,207
1915	307,516	12,742
1916	69,273	4,026

Glass, Plate, Fluted, Rolled, Ribbed or Rough, Ground, Smoothed or Otherwise Obscured.

	Sq. feet.	Dollars.
1912	170,599	39,904
1913	9,617	2,247
1914	614,012	126,917
1915	4,872	1,074
1916	489	124

Glass, Plate—Cast, Polished, Finished or Unfinished, Unsilvered, or the Same Containing a Wire Netting Within Itself.

	Sq. feet.	Dollars.
1912	1,110,743	276,452
1913	1,068,427	247,015
1914	2,819,386	631,596
1915	440,718	100,400
1916	12,782	3,778

Glass, Plate—Cast, Polished, Unsilvered When Bent or Decoated, Etc.

	Sq. feet.	Dollars.
1912	53,104	28,262
1913	88,189	47,449
1914	140,806	62,228
1915	27,121	14,551
1916	7,147	2,726

Glass, Plate—Cast, Polished, Silvered and L. G. Plates, Exceeding in Size 144 Square Inches.

	Sq. feet.	Dollars.
1912	1,380	403
1913	832	527
1914	18,229	4,883
1915	2,592	904
1916	2,657	515

Glass, Plate—Cast, Polished, Silvered, When Bent or Otherwise Decorated.

	Sq. feet.	Dollars.
1912	4,291	1,696
1913	1,510	1,004
1914	19,659	5,854
1915	6,822	2,152
1916	2,570	2,135

Glauber Salts.

	Tons.	Dollars.
1912	340	4,810
1913	240	5,685
1914	228	5,557
1915	53	1,113
1916	1	33

Glazes, Fluxes, Enamels and Colors, Ceramic and Glass.

		Dollars.
1914	.....	38,527
1915	.....	70,782
1916	.....	64,138

Not stated prior to 1914.

Glucose.

	Pounds.	Dollars.
1912	239,383	8,345
1913	212,635	7,166
1914	262,223	9,025
1915	52,799	1,880
1916	1,233	313

Glue.

	Pounds.	Dollars.
1912	7,406,641	770,130
1913	5,099,661	672,266
1914	22,545,681	1,792,612
1915	8,086,283	702,350
1916	3,050,794	219,177

Glue, Size.

	Pounds.	Dollars.
1912	80,649	2,712
1913	99,093	3,018

Included in glue after 1913.

Glycerine, Crude.

	Pounds.	Dollars.
1912	29,734,347	3,649,582
1913	34,390,129	4,247,032
1914	36,230,383	4,473,178
1915	18,661,929	2,185,368
1916	10,875,058	2,209,610

Glycerine, Refined.

	Pounds.	Dollars.
1912	183,868	36,221
1913	432,339	73,336
1914	551,906	90,562
1915	360,567	60,908
1916	993,463	132,469

Gold Beaters' Molds and Skins.

		Dollars.
1912	.....	33,252
1913	.....	26,408
1914	.....	26,634
1915	.....	13,944
1916	.....	23,131

Gold Leaf.

	100 leaves.	Dollars.
1912	38,611	34,859
1913	30,902	28,283
1914	37,527	32,482
1915	13,614	12,549
1916	1,547	773

Grape Sugar.

	Pounds.	Dollars.
1912	21	20
1913	4,338	596
1914	93	48
1915	361	51
1916	110	62

Grease Enfleurage, Not Containing Alcohol.

	Pounds.	Dollars.
1912	72,196	110,824
1913	92,446	124,195
1914	40,638	51,417
1915	28,407	31,578
1916	5,245	8,524

Grease, Soluble, Used in Processes of Softening, Dyeing, or Finishing.

		Dollars.
1912	.....	4,155
1913	.....	4,886
1914	.....	4,401
1915	.....	2,360
1916	.....	584

Grease, Wool, Crude.

	Pounds.	Dollars.
1912	10,789,726	210,997
1913	14,473,551	328,991
1914	12,284,248	292,988
1915	9,281,273	286,706
1916	7,617,713	350,535

Grease, Wool, Refined.

	Pounds.	Dollars.
1912	2,289,189	85,285
1913	2,009,018	86,474
1914	2,691,591	121,847
1915	467,761	23,418
1916	214,599	14,794

Grease and Oils, Sulphur Oil or Olive Foots.

	Pounds.	Dollars.
1913	13,698,352	874,114
1914	11,714,795	772,055
1915	12,946,066	885,810
1916	12,684,936	1,055,292

Not separately stated prior to 1913.

Grease and Oils, All Other (Excepting Fish Oils), Used in Soap Making, Etc.

	Pounds.	Dollars.
1912	27,578,286	1,801,862
1913	7,334,605	291,964
1914	10,684,016	449,561
1915	17,300,356	709,330
1916	11,324,635	482,479

Includes sulphur oil, etc., prior to 1913.

Grease, All Other Not Specially Provided For.

		Dollars.
1912	.....	13,753
1913	.....	14,207
1914	.....	106,041
1915	.....	84,764
1916	.....	81,289

Guano.

	Tons.	Dollars.
1912	34,856	695,140
1913	16,462	313,891
1914	21,853	754,727
1915	20,950	534,371
1916	20,950	534,371
1916	15,732	425,210

Guiacol Carbonate.

	Pounds.	Dollars.
1914	1,637	2,645
1915	6,907	11,125
1916	469	1,160

Not stated prior to 1914.

Gum, Aloes.

	Pounds.	Dollars.
1912	666,229	52,753
1913	909,279	77,998
1914	918,402	64,983
1915	953,186	90,081
1916	1,597,811	152,146

Gum, Amber and Amberoid, Crude.

	Pounds.	Dollars.
1912	35,663	338,821
1913	35,640	339,984
1914	22,485	117,375
1915	9,856	103,136
1916	443	3,599

Gum, Arabic.

	Pounds.	Dollars.
1912	6,586,737	568,631
1913	7,111,354	596,126
1914	2,727,447	182,370

Included in "Arabic or Senegal" after October 3, 1913.

Gum, Arabic or Senegal.

	Pounds.	Dollars.
1914	3,492,682	240,066
1915	5,184,265	402,507
1916	7,617,494	679,928

Gum, Asafoetida.

	Pounds.	Dollars.
1912	138,066	77,035
1913	134,579	55,868
1914	106,338	27,193
1915	51,727	12,656
1916	115,856	30,126

Gum, Benzoin, Gamboge and Mastic.

	Pounds.	Dollars.
1912	94,733	36,163
1913	105,907	41,981
1914	41,975	17,386
1915	106,508	42,940
1916	219,266	73,843

Gum, Camphor, Crude, Natural.

	Pounds.	Dollars.
1912	2,155,781	662,748
1913	3,477,760	979,355
1914	3,476,908	929,725
1915	3,715,387	908,555
1916	4,674,530	1,268,233

Gum, Camphor, Refined.

	Pounds.	Dollars.
1912	248,389	93,080
1913	463,410	153,020
1914	624,508	201,902
1915	1,140,783	406,587
1916	2,304,197	754,498

Gum, Camphor, Synthetic.

	Pounds.	Dollars.
1915	16	3
1916	.....	.....

Not stated prior to 1915.

Gum, Chicle.

	Pounds.	Dollars.
1911	5,368,566	2,551,344
1912	5,296,285	2,433,924
1913	6,920,416	3,059,116
*1914	7,998,187	2,902,454

*Under provisions of law of 1909; imported between July 1 and October 3, 1913; stated separately after 1914.

Gum, Chicle, Crude.

	Pounds.	Dollars.
1914	1,080,665	389,717
1915	2,465,400	839,312
1916	2,728,159	915,817

Gum, Chicle, Refined.

	Pounds.	Dollars.
1914	472,766	214,257
1915	1,934,760	962,889
1916	2,302,186	1,283,809

Gum, Copal, Kauri and Damar.

	Pounds.	Dollars.
1912	24,824,399	2,017,737
1913	31,513,330	2,828,840
*1914	9,207,797	989,808

* Under provisions of law of 1909; imported between July 1 and October 3, 1913; stated separately after 1914.

Gum, Copal.

	Pounds.	Dollars.
1914	13,005,925	938,002
1915	12,528,887	813,985
1916	24,100,156	1,440,238

Gum, Damar.

	Pounds.	Dollars.
1914	3,854,698	337,245
1915	5,388,644	563,056
1916	10,819,590	790,776

Gum, Dextrine, Etc.

	Pounds.	Dollars.
1912	5,352,277	188,332
1913	5,096,891	180,296
1914	6,684,556	213,301

Stated separately after 1914.

Gum, Dextrine, Made from Potato Starch or Potato Flour.

	Pounds.	Dollars.
1914	5,226,421	162,688
1915	4,595,949	154,337
1916	720,106	40,552

Gum, Dextrine, Dextrine Substitutes, Burnt Starch or British Gum.

	Pounds.	Dollars.
1914	471,491	18,180
1915	274,668	12,028
1916	154,882	10,049

Gum, Kauri.

	Pounds.	Dollars.
1914	6,554,887	1,097,989
1915	9,530,267	1,444,315
1916	9,958,933	1,394,527

Gum, Lac, Crude, Seed, Button and Stick.

	Pounds.	Dollars.
1912	384,926	45,963
1913	293,010	36,832
1914	992,425	143,222
1915	1,126,167	88,293
1916	3,485,975	291,176

Gum, Rosin, Crude.

	Pounds.	Dollars.
1912	27,560	3,865
1913	299,983	12,605
1914	2,742,083	58,684
1915	1,505,790	42,085
1916	5,571,325	146,250

Gum, Senegal.

	Pounds.	Dollars.
1912	144,947	20,533
1913	172,528	16,254
*1914	140,097	10,609

* Included in "Arabic or Senegal" after October 3, 1913.

Gum, Shellac.

	Pounds.	Dollars.
1912	18,775,282	2,302,888
1913	22,069,610	3,046,750
1914	16,824,130	2,686,480
1915	24,308,145	3,018,296
1916	25,927,553	3,301,378

Gum, Tragacanth.

	Pounds.	Dollars.
1912	1,502,261	428,849
1913	1,401,721	463,800
1914	1,301,545	460,364
1915	1,025,081	355,119
1916	1,129,704	590,123

Gum, Tragasol.

	Pounds.	Dollars.
1912	1,105,101	22,693
1913	1,028,804	23,998
1914	913,077	20,310
1915	761,390	16,295
1916	931,503	21,587

Hemlock Bark Extract for Tanning, Not Containing Alcohol.

	Pounds.	Dollars.
1915	5,263,296	173,998
1916	5,577,989	390,287

Not stated prior to 1915.

Hide Cutting, Raw, and Other Glue Stock.

		Dollars.
1912	.....	1,698,632
1913	.....	1,773,786
1914	.....	2,126,612
1915	.....	1,504,325
1916	.....	970,313

Honey.

	Gallons.	Dollars.
1912	90,890	51,706
1913	113,792	64,718
1914	49,163	30,291
1915	258,912	107,172
1916	124,268	55,592

Hoofs, Horns, and Parts of, Unmanufactured, Including Horn Strips and Tips.

		Dollars.
1912	.....	354,412
1913	.....	320,192
1914	.....	254,872
1915	.....	156,126
1916	.....	110,169

Hop Extract and Lupulin.

		Dollars.
1912	.....	49,955
1913	.....	34,338
1914	.....	49,451
1915	.....	24,407
1916	.....	3,805

Hops.

	Pounds.	Dollars.
1912	2,983,205	2,223,895
1913	8,471,776	2,843,299
1914	5,360,748	2,775,882
1915	11,710,534	2,738,644
1916	664,284	147,638

Ichthyol.

	Pounds.	Dollars.
1912	49,872	72,184
1913	44,347	61,706
1914	66,957	92,485
1915	51,847	70,664
1916	69,227	59,470

Incense.

		Dollars.
1912	.....	5,378
1913	.....	14,637
1914	.....	24,382
1915	.....	4,328
1916	.....	5,431

India Rubber and Substitutes for, Crude, Balata.

	Pounds.	Dollars.
1912	1,522,293	986,124
1913	1,318,598	766,772
1914	1,525,351	789,261
1915	2,473,228	963,384
1916	2,549,303	997,827

India Rubber and Substitutes for, Crude, Gunyule Gum.

	Pounds.	Dollars.
1912	14,404,482	6,538,723
1913	10,504,945	4,354,400
1914	1,475,804	607,076
1915	5,116,165	1,442,464
1916	2,826,960	881,023

India Rubber and Substitutes for, Crude, Gutta, Joolatong.

	Pounds.	Dollars.
1912	48,848,170	2,252,444
1913	45,444,282	2,197,948
1914	24,224,955	1,175,335
1915	14,765,765	704,613
1916	28,381,105	1,347,176

India Rubber and Substitutes for, Crude, Gutta Percha.

	Pounds.	Dollars.
1912	1,162,687	210,314
1913	1,818,755	271,741
1914	1,552,857	302,623
1915	1,776,851	258,132
1916	2,751,839	327,039

India Rubber, Crude, and Milk of.

	Pounds.	Dollars.
1912	110,101,091	92,956,013
1913	113,218,678	90,110,606
1914	131,938,593	71,223,667
1915	171,429,176	82,812,928
1916	268,101,692	155,112,203

India Rubber, Scrap, or Refuse.

	Pounds.	Dollars.
1912	26,178,749	2,090,938
1913	44,479,429	3,675,824
1914	21,223,493	1,616,786
1915	10,584,494	827,778
1916	13,963,782	932,644

India Rubber, Reclaimed.

	Pounds.	Dollars.
1914	4,767,914	449,291
1915	919,628	112,220
1916	2,236,867	330,979

Not stated prior to 1914.

Indigo, Carmined.

	Pounds.	Dollars.
1912	9,047	5,903
1913	16,320	9,966
1914	2,190	1,333

Not stated after October 3, 1913.

Indigo, Crude, Natural, or Synthetic.

	Pounds.	Dollars.
1912	7,697,482	1,160,473
1913	7,712,488	1,102,893
1914	8,252,528	1,115,128
1915	7,983,112	1,604,767
1916	6,794,518	8,451,501

Indigo, Dyes Obtained From.

		Dollars.
1914	.....	34,342
1915	.....	76,259
1916	.....	155,254

Not stated prior to 1914.

Indigo, Extracts or Pastes.

	Pounds.	Dollars.
1912	223,687	45,984
1913	242,908	43,417
1914	11,998	2,540

Not stated after October 3, 1913.

Ink, Printers'.

		Dollars.
1912	.....	3,890
1913	.....	7,820
1914	.....	24,999
1915	.....	15,022
1916	.....	17,884

Ink, Writing and Copying.

		Dollars.
1912	.....	27,550
1913	.....	28,518
1914	.....	18,941
1915	.....	22,765
1916	.....	21,931

Ink, All Other, Including Ink Powders.

		Dollars.
1912	.....	3,817
1913	.....	4,918
1914	.....	6,931
1915	.....	6,196
1916	.....	3,481

Insulating Compounds.

		Dollars.
1912	.....	2,262
1913	.....	3,080
1914	.....	117
1915	.....	1,192
1916	.....	8,871

Iodine, Crude.

	Pounds.	Dollars.
1912	497,793	962,981
1913	351,256	739,734
1914	230,391	533,447
1915	631,510	1,284,395
1916	1,044,525	2,447,764

Iodine, Resublimed.

	Pounds.	Dollars.
1912	30	111
1913	40	96
1914	57	205
1915	3	7
1916	.....	.....

Iodoform.

	Pounds.	Dollars.
1912	17	49
1913	16	57
1914	86½	301
1915	10	40
1916	.....	.....

Ipecac.

	Pounds.	Dollars.
1912	41,627	59,828
1913	54,648	86,113
1914	78,654	110,316
1915	137,927	248,408
1916	203,734	484,828

Iridium.

	Ounces, troy.	Dollars.
1912	3,301	181,886
1913	5,341	348,333
1914	2,185	154,842
1915	3,801	220,823
1916	2,496	146,055

Iron in Pigs.

	Tons.	Dollars.
1912	114,176	3,642,973
1913	155,900	6,418,582
1914	137,192	4,891,310
1915	108,693	4,218,964
1916	117,357	7,418,340

Isinglass and Prepared Fish Sounds.

	Pounds.	Dollars.
1912	255,367	81,145
1913	225,165	72,640
1914	146,364	56,433
1915	11,906	9,008
1916	13,750	14,498

Jalap.

	Pounds.	Dollars.
1912	119,211	27,607
1913	227,275	44,632
1914	208,901	23,942
1915	176,047	18,485
1916	201,383	13,642

Kainite.

	Tons.	Dollars.
1912	479,817	2,400,590
1913	366,184	2,149,680
1914	526,112	2,579,619
1915	79,124	444,996
1916	64	1,795

Kieserite.

	Tons.	Dollars.
1912	7,545	17,689
1913	10,800	44,770
1914	6,649	28,509
1915	.....	.....
1916	.....	.....

Kyanite or Cyanite.

	Tons.	Dollars.
1912	900	7,535
1913	612	7,949
1914	.....	.....
1915	.....	.....
1916	.....	.....

Lac, Dye.

	Pounds.	Dollars.
1912	57,234	4,594
1913	.....	.....
1914	.....	.....
1915	.....	.....
1916	89,600	13,804

Lactarene, or Casein.

	Pounds.	Dollars.
1912	9,138,338	830,845
1913	8,803,639	651,062
1914	10,799,351	705,365
1915	7,919,742	498,897
1916	10,376,641	984,809

Lakes, Dry or in Pulp, Not Specially Provided For.

		Dollars.
1914	.....	59,608
1915	.....	153,430
1916	.....	29,810

Not stated prior to 1914.

Lanolin.

	Pounds.	Dollars.
1912	31	19
1913	.....	.....
1914	91,477	9,622
1915	89,583	10,448
1916	13,342	6,353

Lard.

	Pounds.	Dollars.
1912	4,427	583
1913	4,117	496
1914	1,251	169

Included in next class after October 3, 1913.

Lard, Lard Compounds and Lard Substitutes.

	Pounds.	Dollars.
1914	124,385	13,665
1915	729,792	79,632
1916	2,405	289

Lead, Acetate of—Brown, Gray or Yellow.

	Pounds.	Dollars.
1912	4,331	251
1913	42	8
1914	17,477	957
1915	.....	.....
1916	124	17

Lead, Acetate, White.

	Pounds.	Dollars.
1912	36,165	1,880
1913	21,599	1,177
1914	110,936	10,768
1915	31,096	1,809
1916	.....	.....

Lead, Nitrate.

	Pounds.	Dollars.
1912	169,932	8,822
1913	11,306	605
1914	11,312	712
1915	.....	.....
1916	2,205	280

Lead, Pigs and Bars, Old Refuse Run Into Bars, Etc.

	Pounds.	Dollars.
1912	5,772,563	176,318
1913	6,905,760	147,838
1914	1,309,204	36,307
1915	951,999	31,385
1916	1,794,880	90,815

Lead Pipes, Shot, Glaziers' Lead and Lead Wire.

	Pounds.	Dollars.
1912	40,267	2,350
1913	33,736	2,404
1914	64,964	4,611
1915	24,042	1,687
1916	193,775	16,436

Leeches.

		Dollars.
1912	.....	6,263
1913	.....	5,587
1914	.....	7,376
1915	.....	1,834
1916	.....	2,810

Lemon, Lime, and Sour Orange Juice.

		Dollars.
1912	.....	117,353
1913	.....	116,370
1914	.....	110,860
1915	.....	139,605
1916	.....	152,575

Licorice, Extract of, in Paste, Rolls or Other Forms.

	Pounds.	Dollars.
1912	961,428	119,717
1913	832,277	106,288
1914	946,016	122,216
1915	1,080,718	152,756
1916	1,702,927	230,129

Licorice Root.

	Pounds.	Dollars.
1912	74,680,270	1,309,819
1913	105,032,429	1,806,756
1914	86,754,245	1,526,057
1915	82,289,410	1,557,442
1916	52,784,042	1,792,573

Lime.

	Pounds.	Dollars.
1912	99,853	54,459
1913	77,319	42,839
1914	65,036	42,926
1915	66,634	29,518
1916	92,321	42,537

Lime, Chloride, or Bleaching Powder.

	Pounds.	Dollars.
1912	72,706,732	600,621
1913	76,092,327	619,492
1914	48,497,239	416,893
1915	18,402,130	197,975
1916	3,289,790	80,418

Lime, Citrate.

	Pounds.	Dollars.
1912	5,903,501	791,416
1913	5,526,954	756,309
1914	3,119,924	496,517
1915	6,242,244	1,102,629
1916	8,127,364	1,763,652

Litharge.

	Pounds.	Dollars.
1912	28,079	1,344
1913	34,022	1,649
1914	43,156	2,355
1915	14,779	774
1916	20,160	1,417

Lithopone.

	Pounds.	Dollars.
1914	7,245,151	218,133
1915	6,185,245	195,828
1916	5,122,083	414,573

Not separately stated prior to 1914.

Litmus.

		Dollars.
1912	.....	378
1913	.....	216
1914	.....	263
1915	.....	59
1916	.....	280

Logwood.

	Tons.	Dollars.
1912	39,924	481,384
1913	36,952	475,484
1914	30,172	379,754
1915	54,704	722,410
1916	134,819	3,437,388

Logwood and Other Dyewood Extracts.

	Pounds.	Dollars.
1912	2,463,422	112,552
1913	2,258,206	111,575
1914	1,228,178	77,119
1915	2,061,368	144,207
1916	2,652,787	316,872

Mace, Unground.

	Pounds.	Dollars.
1912	403,355	188,086
1913	611,005	244,177
1914	287,976	112,178
1915	342,618	124,128
1916	426,096	130,796

Mace, Bombay, or Wild, Unground.

	Pounds.	Dollars.
1915	5,714	771
1916	22,400	6,720

Not stated prior to 1915.

Madder, or Munjeet, or Indian Madder, Ground or Prepared.

	Pounds.	Dollars.
1912	41,957	2,834
1913	30,602	2,806
1914	47,068	3,817
1915	29,327	3,524
1916	68,381	9,037

Magnesia, Calcined.

	Pounds.	Dollars.
1912	112,611	17,080
1913	72,579	12,592
1914	109,396	15,118
1915	145,806	16,012
1916	46,008	7,500

Magnesia, Carbonate of, Precipitated.

	Pounds.	Dollars.
1912	51,891	2,923
1913	77,190	3,811
1914	58,683	3,972
1915	49,731	2,554
1916	19,888	1,414

Magnesia, Sulphate of, or Epsom Salts.

	Pounds.	Dollars.
1912	8,012,226	31,332
1913	9,345,099	35,739
1914	13,560,599	48,742
1915	7,005,598	32,862
1916	1,456,254	8,503

Magnesite, Crude.

	Pounds.	Dollars.
1912	29,415,096	88,482
1913	33,654,260	111,276
1914	21,590,605	46,611
1915	37,463,509	80,625
1916	101,591,459	281,620

Magnesite, Calcined.

	Pounds.	Dollars.
1912	204,997,478	990,241
1913	345,322,155	1,731,443
1914	288,989,577	1,485,273
1915	125,893,407	751,766
1916	32,372,610	282,768

Malt, Barley.

	Bushels.	Dollars.
1912	3,771	5,098
1913	10,131	14,612
1914	11,807	16,086
1915	5,137	6,334
1916	274	413

Malt Extract, Fluid, in Bottles or Jugs.

	Gallons.	Dollars.
1912	713	989
1913	1,405	2,376
1914	1,284	2,087
1915	318	589
1916	64	92

Malt Extract, Fluid, in Casks.

	Gallons.	Dollars.
1912	4,905	5,041
1913	9,191	9,661
1914	10,333	10,050
1915	4,124	3,951
1916	2,488	2,313

Malt Extract, Solid or Condensed.

		Dollars.
1912	.....	4,508
1913	.....	338
1914	.....	767
1915	.....	7,006
1916	.....	11,534

Manganese, Oxide and Ore of.

	Tons.	Dollars.
1912	197,960	1,292,435
1913	407,169	2,195,565
1914	288,837	1,841,472
1915	206,913	1,494,965
1916	492,967	5,358,087

Manna.

	Pounds.	Dollars.
1912	96,307	49,335
1913	30,869	16,303
1914	88,240	32,848
1915	36,833	12,276
1916	68,447	32,434

Manure Salts, Including Double Manure Salts, Not Specially Provided For.

	Tons.	Dollars.
1912	185,682	1,828,426
1913	172,557	1,798,773
1914	260,977	2,757,013
1915	66,411	757,151
1916	2,278	42,368

Marshmallow or Althea Flowers or Leaves.

	Pounds.	Dollars.
1912	218	7
1913	561	27
1914	.....	.....
1915	4,695	245
1916	8,161	1,126

Marshmallow or Althea Roots, Crude.

	Pounds.	Dollars.
1913	4,270	538
1914	6,049	514
1915	6,645	1,209
1916	7,242	1,926

Meat Extracts, Fluid.

	Pounds.	Dollars.
1912	27,472	13,842
1913	29,091	11,096
1914	3,768	3,956
1915	3,738	4,428
1916	172	264

Meat Extracts, All Other.

	Pounds.	Dollars.
1912	154,354	102,012
1913	106,313	138,489
1914	130,672	198,187
1915	97,656	139,936
1916	78,614	100,652

Meerschaum, Crude or Unmanufactured.

		Dollars.
1912	.....	197,647
1913	.....	119,457
1914	.....	102,803
1915	.....	18,956
1916	.....	.....

Menthol.

	Pounds.	Dollars.
1912	51,720	200,532
1913	49,896	289,058
1914	127,924	408,954
1915	111,020	236,759
1916	145,203	300,589

Mica, Ground.

	*Pounds.	Dollars.
1912	.....	4,942
1913	577,061	6,592
1914	401,603	4,002
1915	378,768	4,143
1916	436,037	4,302

*Quantity not stated prior to 1913.

Milk, Sugar of.

	Pounds.	Dollars.
1912	2,697	1,731
1913	9,026	2,582
1914	578,727	67,901
1915	250,212	28,154
1916	22,400	3,101

Mineral Salts Obtained by Evaporation from Mineral Waters.

	Punds.	Dollars.
1912	94,106	38,595
1913	103,337	35,420
1914	82,569	40,840
1915	10,757	9,642
1916	425	213

Monozite Sand and Thorite.

	Pounds.	Dollars.
1912	510,781	41,436
1913	1,145,010	94,425
1914	170,792	12,984
1915	1,493,028	133,819
1916	2,468,146	191,576

Morphia, or Morphine, Sulphate of.

	Ounces.	Dollars.
1912	13,825	78,891
1913	24,797	141,221
1914	5,805	14,220
1915	1,383	3,300
1916	2,685	8,906

Mustard, Ground or Prepared, in Bottles or Otherwise.

	Pounds.	Dollars.
1912	1,400,049	372,323
1913	1,433,118	383,710
1914	1,927,686	519,333
1915	1,089,400	299,444
1916	1,836,402	554,380

Musk, in Grain.

		Dollars.
1912	.....	4,964
1913	.....	7,699
1914	.....	3,991
1915	.....	665
1916	.....	534

Musk, in Pods.

	Ounces.	Dollars.
1912	5,232	46,720
1913	12,994	124,855
1914	3,331	30,373
1915	10,115	65,882
1916	7,390	62,094

Myrabolans Fruit.

	Pounds.	Dollars.
1912	22,797,689	185,277
1913	19,735,724	195,264
1914	24,256,373	438,672
1915	18,417,434	198,347
1916	25,612,765	375,401

Naphthalin, Phenol and Cresol.

		Dollars.
1914	.....	195,713
1915	.....	233,458
1916	.....	518,140

Not stated prior to 1914.

Nickel Oxides.

	Pounds.	Dollars.
1912	714	856
1913	1,124	398
1914	2,720	1,245
1915	1,071	505
1916	497	130

Nuts and Nutgalls for Dyeing and Tanning.

		Dollars.
1912	.....	129,457
1913	.....	126,435
1914	.....	177,788
1915	.....	137,972
1916	.....	420,030

Nutgall, Extract.

	Pounds.	Dollars.
1912	148,725	16,145
1913	145,919	18,228
1914	205,130	25,017
1915	157,084	25,262
1916	61,055	11,444

Nutmegs, Unground.

	Pounds.	Dollars.
1912	2,097,422	304,757
1913	3,458,339	368,984
1914	1,755,653	184,779
1915	2,879,986	285,861
1916	3,590,959	420,503

Nux Vomica.

	Pounds.	Dollars.
1912	2,427,187	37,782
1913	2,306,735	39,380
1914	1,891,072	32,983
1915	2,245,338	51,507
1916	4,355,964	134,366

Oakum.

	Pounds.	Dollars.
1912	1,104,280	43,944
1913	1,326,876	64,851
1914	1,884,439	94,796
1915	1,509,155	78,079
1916	1,233,934	78,193

Oak Extract for Tanning, Not Containing Alcohol.

	Pounds.	Dollars.
1914	143,094	6,539
1915	65,293	2,628
1916	.....	.....

Not stated prior to 1914.

*Ocher, Ground in Oil or Water.

	Pounds.	Dollars.
1912	16,346	901
1913	16,988	970

*Included in "Ocher and Ochery Earths" after 1913.

Ocher and Ochery Earths.

	Pounds.	Dollars.
1912	11,729,835	110,398
1913	17,583,272	162,387
1914	21,641,976	154,547
1915	17,430,128	124,359
1916	18,049,375	153,880

Oilcake, Cottonseed.

	Pounds.	Dollars.
1912	1,743,113	15,706
1913	400,686	3,322
1914	5,744,090	53,214
1915	1,743,113	15,706
1916	10,289,336	108,413

Oilcake, Corn.

	Pounds.	Dollars.
1912	96,200	1,209
1913	102,700	1,282
1914	91,700	1,227
1915	37,500	562
1916	10,900	191

Oilcake, Cottonseed and Linseed (Bibby's).

	Pounds.	Dollars.
1912	4,015,908	62,755
1913	2,571,694	37,455
1914	2,406,035	24,332
1915	2,996,201	38,238
1916	10,819,746	129,843

Oilcake, Rapeseed.

	Pounds.	Dollars.
1912	408,576	3,949
1913	.....	.....
1914	.....	.....
1915	47,278	11,204
1916	4,125	75

Oilcake, Soya Bean.

	Pounds.	Dollars.
1912	10,196,657	120,191
1913	7,004,803	93,002
1914	3,163,260	38,255
1915	5,975,592	64,307
1916	10,468,001	103,081

Oilcake, All Other Bean.

	Pounds.	Dollars.
1912	55,000	451
1913	579,794	5,914
1914	142,878	1,685
1915	724,072	13,035
1916	4,802,119	83,173

Oil, Alizarine, Assistant.

	Gallons.	Dollars.
1912	108,331	49,839
1913	137,187	62,923
1914	186,234	72,430
1915	48,370	18,820
1916	7,382	4,134

Oil, Almond, Bitter.

	Pounds.	Dollars.
1912	27,315	25,357
1913	10,442	25,629
1914	7,525	21,954
1915	2,711	9,184
1916	3,602	18,400

Oil, Almond, Sweet.

	Pounds.	Dollars.
1912	110,927	41,294
1913	152,300	63,583
1914	52,550	22,777
1915	43,321	23,495
1916	68,838	36,400

Oil, Amber.

	Pounds.	Dollars.
1912	15,493	1,293
1913	18,707	1,027
1914	15,648	1,058
1915	2,720	239
1916	674	250

Oil, Animal, Rendered and Combinations, Not Specially Provided For.

	Gallons.	Dollars.
1912	1,574	966
1913	4,030	2,023
1914	115,871	23,527
1915	140,815	30,464
1916	90,135	31,985

Oil, Anise, or Anise Seed.

	Pounds.	Dollars.
1912	77,454	86,207
1913	127,501	173,078
1914	42,377	55,602
1915	117,188	119,972
1916	206,609	156,411

Oil, Bergamot.

	Pounds.	Dollars.
1912	67,526	315,227
1913	64,259	310,835
1914	38,647	148,753
1915	58,621	157,519
1916	69,440	178,300

Oil, Birch Tar.

	Pounds.	Dollars.
1914	40,123	1,898
1915	12,098	571
1916	47,757	3,183

Not stated prior to 1914.

Oil, Cajeput.

	Pounds.	Dollars.
1912	17,995	3,776
1913	9,143	3,224
1914	14,110	4,757
1915	19,243	6,999
1916	96,626	18,992

Oil, Camomile.

	Pounds.	Dollars.
1912	31	394
1913	4½	88
1914	12	247
1915	3	67
1916	.....	.....

Oil, Camphor.

	Pounds.	Dollars.
1912	.....	.....
1913	.....	.....
1914	18,874	3,160
1915	68	12
1916	8,333	5,708

Oil, Caraway.

	Pounds.	Dollars.
1912	30,373	21,412
1913	10,107	10,453
1914	5,669	5,063
1915	18,107	20,750
1916	15,567	23,536

Oil, Cassia and Cinnamon.

	Pounds.	Dollars.
1912	142,182	101,066
1913	123,645	97,438
1914	79,155	49,528
1915	54,962	34,411
1916	121,034	85,974

Oil, Castor.

	Gallons.	Dollars.
1912	6,971	6,721
1913	5,241	6,396
1914	189,583	88,053
1915	63,005	29,206
1916	253,077	223,130

Oil, Cedrat.

	Pounds.	Dollars.
1912	424	1,329
1913	115	555
1914	159	770
1915	788	3,721
1916	438	1,966

Oil, Chinese Nut.

	Gallons.	Dollars.
1912	4,816,252	2,373,163
1913	6,004,045	2,738,000
1914	4,878,764	1,960,426
1915	4,723,584	1,649,270
1916	4,968,262	1,977,823

Oil, Citronella and Lemongrass.

	Pounds.	Dollars.
1912	1,104,968	281,577
1913	885,486	287,549
1914	702,516	263,149
1915	865,376	307,676
1916	1,054,211	387,631

Oil, Civet.

	Ounces.	Dollars.
1912	992	1,225
1913	1,155	1,668
1914	250	392
1915	5,181	7,365
1916	.....	.....

Oil, Cocoanut, Not Refined or Deodorized.

	Pounds.	Dollars.
1912	46,021,118	3,828,845
1913	50,493,858	4,182,654
1914	74,588,195	6,726,107
1915	63,249,424	5,430,581
1916	66,574,349	6,052,225

Oil, Cod.

	Gallons.	Dollars.
1912	465,962	172,842
1913	466,494	135,969
1914	1,091,246	382,992
1915	1,372,413	433,142
1916	1,578,227	678,327

Oil, Codliver.

	Gallons.	Dollars.
1912	241,755	200,658
1913	262,516	137,872
1914	371,567	262,927
1915	264,630	157,000
1916	170,876	334,006

Oil, Cottonseed.

	Pounds.	Dollars.
1912	1,958,831	100,517
1913	3,383,906	185,396
1914	17,510,918	1,046,703
1915	15,162,360	728,961
1916	17,516,391	924,654

Oil, Creosote, or Dead.

	Gallons.	Dollars.
1912	50,319,736	2,284,845
1913	63,997,602	3,711,328
1914	50,271,)677	3,822,919
1915	37,352,340	2,541,845
1916	40,496,987	3,206,780

Oil, Croton.

	Pounds.	Dollars.
1912	1,619	1,390
1913	4,873	4,414
1914	6,186	5,649
1915	4,010	3,481
1916	.....	.....

Oil, Eucalyptus.

	Pounds.	Dollars.
1912	72,830	16,431
1913	31,047	7,205
1914	68,053	21,079
1915	99,218	27,095
1916	110,736	29,993

Oil, Fennel.

	Pounds.	Dollars.
1912	6,895	2,946
1913	5,702	4,160
1914	4,078	2,416
1915	400	441
1916	610	789

Oil, Fish (Not Specially Provided for), Including Sod Oil.

	Gallons.	Dollars.
1912	607,027	179,963
1913	519,121	152,803
1914	517,562	154,775
1915	439,741	108,739
1916	720,033	235,536

Oil, Fusel or Amylic Alcohol.

	Pounds.	Dollars.
1912	5,468,554	1,464,031
1913	5,116,660	1,183,872
1914	5,679,801	888,869
1915	3,298,228	699,512
1916	2,162,617	695,196

Oil, Hempseed.

	Gallons.	Dollars.
1914	375	123
1915	.....	.....
1916	10	5

Oil, Jasmine.

	Pounds.	Dollars.
1912	2,074	29,620
1913	3,416	39,554
1914	611	14,360
1915	261	5,160
1916	978	27,592

Oil, Juniper.

	Pounds.	Dollars.
1912	20,808	10,620
1913	17,356	13,037
1914	14,545	8,691
1915	10,388	7,637
1916	975	1,988

Oil, Lavender, and Aspic or Spike Lavender.

	Pounds.	Dollars.
1912	162,920	268,347
1913	227,013	482,779
1914	64,541	100,431
1915	72,989	133,375
1916	198,205	271,815

Oil, Lemon.

	Pounds.	Dollars.
1912	12,821	9,165
1913	410,003	794,215
1914	329,440	752,714
1915	561,387	630,338
1916	435,030	360,862

Oil, Limes.

	Pounds.	Dollars.
1912	12,821	1,165
1913	13,075	15,025
1914	16,559	23,828
1915	9,154	9,279
1916	19,765	29,694

Oil, Linseed or Flaxseed, Raw, Boiled or Oxidized.

	Gallons.	Dollars.
1912	809,307	638,816
1913	172,522	110,840
1914	187,933	91,544
1915	537,810	249,611
1916	56,899	36,399

Oil, Mace.

	Pounds.	Dollars.
1912	1,944	902
1913	5,737	2,611
1914	2,652	1,380
1915	4,776	2,605
1916	3,400	2,224

Oil, Neroli, or Orange Flower.

	Pounds.	Dollars.
1912	17,437	71,054
1913	38,365	171,932
1914	15,928	73,265
1915	13,251	31,478
1916	34,447	66,768

Oil, Olive (for Manufacturing Purposes Only).

	Gallons.	Dollars.
1912	702,565	438,542
1913	725,100	483,329
1914	799,260	503,093
1915	717,361	498,689
1916	919,633	711,468

Oil, Olive, Edible.

	Gallons.	Dollars.
1912	4,760,880	6,065,690
1913	4,772,775	6,227,526
1914	6,391,827	8,201,831
1915	6,622,246	8,119,512
1916	6,924,606	9,324,361

Oil, Orange.

	Pounds.	Dollars.
1912	97,065	168,831
1913	77,797	155,290
1914	104,491	222,116
1915	97,014	140.246
1916	97,359	134,025

Oil, Origanum, Red or White.

	Pounds.	Dollars.
1912	718	645
1913	8,822	8,502
1914	507	630
1915	14,349	15,111
1916	24,222	24.291

Oil, Palm.

	Pounds.	Dollars.
1912	46,907,934	3,080,681
1913	48,442,662	3,368,815
1914	61,753,482	4,118,077
1915	31,482,292	2,024,827
1916	40,621,318	2,918,523

Oil, Palm Kernel.

	Pounds.	Dollars.
1912	25,910,154	2,073,721
1913	23,570,152	1,850,270
1914	30,588,958	2,826,972
1915	4,908,792	446,979
1916	6,273,340	479,738

Oil, Paraffin.

	Gallons.	Dollars.
1912	142,076	34,120
1913	116,192	35,193
1914	167,384	55,923
1915	60,412	13,609
1916	74,250	149,625

Oil, Peanut.

	Gallons.	Dollars.
1912	878,660	578,417
1913	1,221,676	820,359
1914	1,332,108	915,439
1915	830,658	665,747
1916	1,466,043	824,327

Oil, Peppermint.

	Pounds.	Dollars.
1912	1,839	11,411
1913	3,529	32,097
1914	18,794	41,367
1915	9,200	8,959
1916	17,066	12,573

Oil, Perilla.

	Pounds.	Dollars.
1914	117,893	6,060
1915	69,174	5,483
1916	65,500	5,504

Not stated prior to 1914.

Oil, Poppy Seed, Raw, Boiled or Oxidized.

	Gallons.	Dollars.
1912	8,462	6,508
1913	9,605	7,788
1914	7,973	6,422
1915	11,045	7,072
1916	6,537	6,816

Oil, Rapeseed.

	Gallons.	Dollars.
1912	1,185,007	588,495
1913	1,564,659	784,750
1914	1,463,099	704,747
1915	1,491,999	784,235
1916	2,534,679	1,414,022

Oil, Rosemary, or Anthross.

	Pounds.	Dollars.
1912	153,592	62,360
1913	284,144	100,930
1914	85,243	30,177
1915	93,663	44,636
1916	96,815	30,544

Oil, Roses, Attar of.

	Ounces	Dollars.
1912	109,065	580,783
1913	133,325	791,370
1914	40,454	301,000
1915	60,011	252,592
1916	40,887	169,744

Oil, Seal.

	Gallons.	Dollars.
1912	1,183	575
1913	8,972	3,133
1914	179,754	64,963
1915	479,571	166,836
1916	510,062	271,979

Oil, Sesame, or Sessamum Seed.

	Pounds.	Dollars.
1912	1,380,637	109,173
1913	1,936,647	158,442
1914	1,389,649	118,075
1915	341,545	28,653
1916	257,874	22,293

Oil, Soya Bean.

	Pounds.	Dollars.
1912	28,019,560	1,578,968
1913	12,440,406	635,882
1914	16,363,645	830,870
1915	19,210,028	901,643
1916	98,171,275	5,131,582

Oil, Thyme.

	Pounds.	Dollars.
1912	66,039	47,862
1913	138,972	105,296
1914	89,148	63,864
1915	99,580	88,498
1916	92,097	85,913

Oil, Valerian.

	Pounds.	Dollars.
1912	18	55
1913	40	124
1914	6	12
1915	15	36
1916	.....	.....

Oil, Whale (Includes Sperm Oil Prior to October 3, 1913).

	Gallons.	Dollars.
1912	863,192	254,430
1913	1,166,339	278,208
*1914	82,766	26,553

*July 1 to October 3, 1913. Stated separately after October 3, 1913.

Oil, Whale, Sperm.

	Gallons.	Dollars.
1914	157,142	66,652
1915	92,033	38,612
1916	59,816	25,191

Oil, Whale, All Other.

	Gallons.	Dollars.
1914	290,745	94,424
1915	604,503	215,644
1916	230,762	79,569

Opium, Aqueous Extract of, and Tinctures of, as Laudanum.

		Dollars.
1912	.....	.....
1913	.....	671
1914	.....	5,279
1915	.....	5,565
1916	.....	6

Opium, Crude, or Unmanufactured, Not Adulterated.

	Pounds.	Dollars.
1912	384,912	2,020,026
1913	441,277	2,130,154
1914	441,621	1,731,689
1915	353,006	1,699,217
1916	117,870	533,183

Opium, Dried, Powdered, or Otherwise Advanced.

	Pounds.	Dollars.
1912	77,551	641,887
1913	49,071	389,864
1914	32,095	295,684
1915	38,977	308,928
1916	44,052	243,790

Opium Salts and Other Alkaloids of, Not Specially Provided for.

	Ounces.	Dollars.
1912	634	1,742
1913	9,672	28,587
1914	11,593	64,528
1915	8,626	49,584
1916	2,360	9,981

Orange Mineral.

	Pounds.	Dollars.
1912	443,802	25,998
1913	287,535	18,595
1914	362,963	24,692
1915	166,202	12,279
1916	108,275	10,589

Orchil, or Orchil Liquid.

		Dollars.
1912	.....	34,653
1913	.....	27,386
1914	.....	21,569
1915	.....	37,802
1916	.....	114,603

Orris, or Iris, Root.

	Pounds.	Dollars.
1912	583,303	4,395
1913	357,963	37,326
1914	580,484	71,941
1915	554,125	52,893
1916	602,289	62,552

Osmiridium.

	Ounces, troy.	Dollars.
1914	666	43,659
1915	911	58,014
1916	302	9,654

Not stated prior to 1914.

Palladium.

	Ounces, troy.	Dollars.
1912	2,254	96,525
1913	9,577	401,707
1914	3,986	169,171
1915	40	2,779
1916	8,011	304,559

Papers Filtering and Crepe.

	Pounds.	Dollars.
1912	516,544	88,435
1913	665,136	116,582
1914	984,597	344,538
1915	875,497	114,390
1916	672,402	128,805

Papers, Greaseproof and Imitation Parchment.

	Pounds.	Dollars.
1914	4,011,250	205,797
1915	3,907,097	200,103
1916	687,009	45,977

Not separately stated prior to 1914.

Paraffin.

(Not including oil.)

	Pounds.	Dollars.
1912	8,055,216	351,415
1913	11,521,205	503,802
1914	7,501,463	327,402
1915	5,628,811	254,389
1916	8,526,929	418,362

Paris Green and London Purple.

	Pounds.	Dollars.
1912	183,089	4,783
1913	165,820	7,692
1914	33,373	3,572
1915	16,800	2,975
1916	31,917	8,163

Pearl Hardening for Paper Makers' Use.

		Dollars.
1912	.....	6,679
1913	.....	8,612
1914	.....	5,294
1915	.....	3,609
1916	.....	593

Pepper, Black or White, Unground.

	Pounds.	Dollars.
1912	26,450,845	2,617,440
1913	27,568,317	2,855,184
1914	21,809,875	2,179,995
1915	26,620,992	2,685,522
1916	32,174,546	3,789,466

Pepper, Cayenne, Capsicum or Red Pepper, Ground or Unground.

	Pounds.	Dollars.
1912	6,422,773	597,632
1913	4,022,755	412,823
*1914	984,716	130,076

* Figures are for July 1 to October 3, 1913. Stated separately after October 3, 1913.

Pepper, Capsicum, Red or Cayenne, Unground.

	Pounds.	Dollars.
1914	6,522,463	711,966
1915	3,093,232	332,616
1916	4,354,041	477,044

Pepper, Capsicum, Red or Cayenne, Ground.

	Pounds.	Dollars.
1914	1,322,308	165,807
1915	1,827,666	207,379
1916	2,265,154	271,244

Perfumery, Alcoholic, Toilet Waters, Etc.

	Pounds.	Dollars.
1912	271,838	738,549
1913	286,025	819,685
1914	301,443	771,758
1915	240,075	680,930
1916	281,387	828,727

Perfumery, Cosmetics and Toilet Preparations Not Containing Alcohol, Not Specially Provided For.

		Dollars.
1912	.....	872,478
1913	.....	1,026,369
1914	.....	1,086,211
1915	.....	1,542,131
1916	.....	1,271,614

Persian Berry Extracts for Dyeing.

	Pounds.	Dollars.
1912	81,363	9,020
1913	64,883	7,173
1914	115,336	12,954
1915	92,876	12,245
1916	17,353	4,227

Petroleum, Crude.

	Gallons.	Dollars.
1912	140,788,173	2,549,651
1913	459,542,222	7,608,796
1914	843,080,788	11,779,938
1915	653,757,824	8,918,138
1916	859,736,962	12,226,179

Petroleum, Refined, Benzine.

	Gallons.	Dollars.
1912	15,978,776	985,768
1913	14,162,423	1,266,896
1914	16,152,167	1,399,630
1915	6,783,627	727,855
1916	5,100	2,150

Petroleum, Refined, Gasoline and Naphtha.

	Gallons.	Dollars.
1912	7,564	1,888
1913	570	118
1914	14,175	1,992
1915	1,136,797	34,701
1916	2,638	458

Petroleum, Refined, All Other.

	Gallons.	Dollars.
1912	2,155,499	211,955
1913	1,464,412	307,479
1914	1,796,093	430,664
1915	496,968	98,696
1916	1,727,083	134,815

Pewter and Brittania Metal, Old and Fit Only to Be Remanufactured.

	Pounds.	Dollars.
1912	4,640	984
1913	22,270	6,099
1914	10,408	2,219
1915	23,039	5,397
1916	28,294	8,002

Phenolphahalein.

	Pounds.	Dollars.
1914	14,076	14,090
1915	49,326	46,295
1916	11,432	9,740

Not stated prior to 1914.

Phosphate, Crude.

	Tons.	Dollars.
1912	20,685	179.605
1913	23,478	184,204
1914	23,551	177,838
1915	2,601	26,982
1916	8,190	69,820

Phosphorus.

	Pounds.	Dollars.
1912	11,632	5,074
1913	650	270
1914	605	264
1915	612	251
1916	.....	.....

Pimento, Unground.

	Pounds.	Dollars.
1912	3,444,665	137,246
1913	7,212,109	259,508
1914	1,517,971	54,506
1915	1,330,158	36,769
1916	1,355,575	46,241

Pitch, Burgundy.

	Pounds	Dollars.
1912	833,393	66,795
1913	977,629	43,799
1914	1,055,327	40,480
1915	131,967	4,051
1916	14,756	673

Pitch, Marine Glue.

	Pounds.	Dollars.
1912	261,624	11,910
1913	303,186	14,392
1914	317,506	15,154
1915	56,532	3,807
1916	.....	.....

Plaster Rock, or Gypsum, Crude.

	Tons.	Dollars.
1912	363,657	426,524
1913	386,927	462,889
1914	417,580	482,320
1915	260,161	316,308
1916	481,633	20,496

Plaster Rock, or Gypsum, Ground or Calcined.

	Tons.	Dollars.
1912	402	3,952
1913	3,910	26,228
1914	4,292	30,225
1915	3,943	30,333
1916	306,757	372,308

Plasters, Healing, or Curative, and Court Plaster.

		Dollars.
1912	.....	4,589
1913	.....	4,639
1914	.....	10,929
1915	.....	7,171
1916	.....	8,094

Plumbago or Graphite.

	Tons.	Dollars.
1912	18,590	1,428,386
1913	25,233	1,972,177
1914	24,866	1,846,074
1915	17,067	1,387,873
1916	30,938	4,298,530

Polishing and Cleaning Creams.

		Dollars.
1914	.....	6,085
1915	.....	11,000
1916	.....	14,133

Not stated prior to 1914.

Potash, Bicarbonate of, Refined.

	Pounds.	Dollars.
1912	276,204	13,155
1913	311,645	14,295
1914	478,853	22,767
1915	383,534	20,341
1916	2,062	614

Potash, Bichromate and Chromate of

	Pounds.	Dollars.
1912	24,094	2,273
1913	27,671	2,601
1914	34,860	2,822
1915	40,227	3,317
1916	2,291	391

Potash, Carbonate of, Crude.

	Pounds.	Dollars.
1912	6,747,150	211,602
1913	10,063,912	295,066
1914	9,046,302	240,451
1915	8,620,504	291,341
1916	444,241	27,689

Potash, Carbonate of, Refined.

	Pounds.	Dollars.
1912	11,627,209	383,958
1913	14,035,111	412,587
1914	10,421,005	368,958
1915	2,377,940	92,959
1916	174,587	38,604

Potash, Caustic or Hydrate of, Unrefined.

	Pounds.	Dollars.
1912	8,422,007	330,684
1913	8,904,449	348,501
1914	8,565,451	326,650

Included in "Potash, Hydrate of, etc.," after 1914.

Potash, Caustic or Hydrate of, Refined.

	Pounds.	Dollars.
1912	77,184	8,097
1913	112,822	11,920
1914	18,751	1,977

Included in "Potash, Hydrate of, etc.," after 1914.

Potash, Chlorate of.

	Pounds.	Dollars.
1912	42,131	3,444
1913	1,235,732	66,609
1914	40,319	3,408
1915	27,419	4,614
1916	.....	.....

Potash, Crude, or Black Salts.

	Pounds.	Dollars.
1914	2,599,883	52,454
1915	4,076,783	83,502
1916	1,504,149	53,752

Not stated prior to 1914.

Potash, Cyanide of.

	Pounds.	Dollars.
1912	2,095,541	312,777
1913	950,890	137,535
1914	1,236,799	183,259
1915	747,627	143,331
1916	43,705	9,311

Potash, Hydrate of, Containing Not More Than 15 Per Cent. of Caustic Soda.

	Pounds.	Dollars.
1915	4,993,471	225,002
1916	39,770	9,222

Not stated prior to 1915.

Potash, Muriate of.

	Tons.	Dollars.
1912	242,033	7,235,729
1913	223,887	6,797,757
1914	234,856	7,925,781
1915	102,882	3,660,353
1916	2,126	460,888

Potash, Permanganate of.

	Pounds.	Dollars.
1912	432,937	29,962
1913	357,366	25,314
1914	1,351,855	91,065
1915	1,039,804	78,924
1916	214,291	67,306

Potash, Prussiate of, Red.

	Pounds.	Dollars.
1912	71,612	11,294
1913	65,516	11,302
1914	89,976	15,325
1915	83,574	14,922
1916	2,560	3,520

Potash, Prussiate of, Yellow.

	Pounds.	Dollars.
1912	2,072,761	203,295
1913	2,812,408	309,302
1914	3,508,228	390,021
1915	2,316,736	255,711
1916	44,156	31,651

Potash, Sulphate of.

	Tons.	Dollars.
1912	50,551	1,853,235
1913	48,023	1,798,369
1914	44,986	1,887,491
1915	21,705	1,071,623
1916	2,427	197,808

Potassium, Iodide.

	Pounds.	Dollars.
1912	238	451
1913	120	219
1914	270	491
1915	4	13
1916	309	1,032

Putty (Whiting and Paris White), Ground in Oil.

	Pounds.	Dollars.
1912	29,047	866
1913	36,434	881
1914	37,020	913
1915	18,078	343
1916	16,082	386

Quebracho Extract.

	Pounds.	Dollars.
1912	74,239,715	2,442,893
1913	63,604,814	1,672,314
1914	99,605,859	2,699,104
1915	125,565,857	3,676,749
1916	81,501,892	5,432,458

Quebracho Wood.

	Tons.	Dollars.
1912	68,174	982,315
1913	101,869	1,300,126
1914	73,957	900,880
1915	54,715	750,873
1916	106,804	1,598,465

Quicksilver.

	Pounds.	Dollars.
1912	193,411	100,270
1913	380	387
1914	444,673	192,609
1915	501,924	292,244
1916	554,852	595,057

Quill Toothpicks.

		Dollars.
1912	.....	8,166
1913	.....	18 646
1914	.....	10,041
1915	.....	8,519
1916	.....	21,543

Quill, Other Manufactures of.

		Dollars.
1912	.....	11,185
1913	.....	6,959
1914	.....	11,641
1915	.....	9,342
1916	.....	1,347

Quinia, Sulphate of.

	Ounces.	Dollairs.
1912	2,368,840	361,111
1913	2,279,734	397,409
1914	2,224,765	486,641
1915	1,508,951	378,511
1916	1,409,228	1,022,821

Radium, and Salts of, and Radioactive Substances.

		Dollars.
1915	.....	29,963
1915	.....	29,983
1916	.....	3,712

Not stated prior to 1914.

Red Lead.

	Pounds.	Dollars.
1912	1,106,692	47,484
1913	145,478	7,223
*1914	69,867	5,674
1915	6,697	342
1916	196	43

*29,940 pounds, $3,681, came in free of duty for construction and equipment of vessels.

Rennets, Raw or Prepared,

		Dollars.
1912	.....	102,142
1913	.....	129,588
1914	.....	129,720
1915	.....	106,614
1916	.....	86,694

Rhubarb Root.

	Pounds.	Dollars.
1912	149,838	15,766
1913	121,701	16,554
1914	181,240	22,354
1915	233,699	24,592
1916	155,924	17,701

Rose Leaves.

		Dollars.
1912	.....	3
1913	.....	67
1914	.....	1,434
1915	.....	484
1916	.....	1,060

Rosin, Violin.

		Dollars.
1912	.....	64,147
1913	.....	30,021
1914	.....	11,625
1915	.....	6,532
1916	.....	4,893

Rotten Stone and Tripoli.

		Dollars.
1912	.....	34,147
1913	.....	30,021
1914	.....	20,858
1915	.....	24,796
1916	.....	38,613

Saccharin.

	Pounds.	Dollars.
1912	457	373
1913	47	64
1914	8	30
1915	5,617	6,737
1916	12,954	76,789

Saffron, Safflower, and Extract of, and Saffron Cake, Not Containing Alcohol.

		Dollars.
1912	.....	91,203
1913	.....	93,146
1914	.....	85,678
1915	.....	70,132
1916	.....	111,420

Sage, Unground.

	Pounds.	Dollars.
1912	1,518,524	24,496
1913	1,299,120	19,893
1914	2,005,469	39,309
1915	822,083	48,454
1916	1,865,815	130,464

Sago, Crude, and Sago Flour.

	Pounds.	Dollars.
1912	8,842,299	169,170
1913	12,389,192	230,962
1914	9,970,717	160,924
1915	6,630,400	106,090
1916	10,999,587	234,073

Salep or Salop.

		Dollars.
1912	.....	154
1913	.....	44
1914	.....	75
1915	.....	2,762
1916	.....	.....

Salicin.

	Pounds.	Dollars.
1912	3,855	13,500
1913	3,274	12,146
1914	4,129	14,962
1915	1,800	6,560
1916	453	2,135

Salol.

	Pounds.	Dollars.
1914	660	219
1915	23,430	11,445
1916	4,069	2,182

Not stated prior to 1914.

Salt.

	100 pounds.	Dollars.
1912	2,901,815	379,540
1913	2,508,361	356,911
1914	3,397,496	456,426

Stated separately after 1914; see following classes.

Salt in Bags, Barrels or Other Packages.

	100 pounds.	Dollars.
1915	620,462	213,676
1916	552,616	195,791

Salt in Bulk.

	100 pounds.	Dollars.
1915	1,959,638	172,888
1916	1,591,062	134,975

Salt Cake (Sulphate of Soda).

	Tons.	Dollars.
1911	11,398	121,218
1912	659	8,394
1913	189	4,771
1914	206	2,456
1915	189	3,566
1916	91	6,392

Saltpeter, Crude.

	Pounds.	Dollars.
1912	6,172,441	213,258
1913	10,989,382	288,905
1914	3,547,252	115,470
1915	677,785	22,483
1916	5,412,130	734,123

Saltpeter, Refined.

	Tons.	Dollars.
1912	222	23,896
1913	431	22,142
1914	163	20,173
1915	34	4,222
1916	2	749

Santonine, and Its Combination with Acids Not Subject to Duty.

	Pounds.	Dollars.
1912	3,090	39,956
1913	1,982	44,358
1914	5,290	125,128
1915	912	25,558
1916	20,925	586,850

Saponin.

		Dollars.
1914	.....	6,643
1915	.....	5,967
1916	.....	413

Not stated prior to 1914.

Sarsaparilla Root.

	Pounds.	Dollars.
1912	452,917	51,428
1913	301,308	38,360
1914	224,970	36,284
1915	250,178	36,055
1916	291,276	41,489

Seed, Anise.

	Pounds.	Dollars.
1912	958,725	66,180
1913	1,290,831	84,941
1914	231,117	15,412
1915	432,893	30,932
1916	789,487	68,713

Seed, Canary.

	Pounds.	Dollars.
1912	4,704,625	106,276
1913	6,219,623	184,596
1914	4,503,280	190,530
1915	4,911,298	208,835
1916	5,368,551	181,898

Seed, Caraway.

	Pounds.	Dollars.
1912	3,616,481	176,182
1913	3,691,831	234,294
1914	1,909,300	107,599
1915	2,895,418	172,742
1916	2,978,581	280,146

Seed, Cardamom.

	Pounds.	Dollars.
1912	81,964	47,403
1913	113,461	104,287
1914	80,782	72,148
1915	152,679	106,180
1916	225,687	119,102

Seed, Coriander.

	Pounds.	Dollars.
1912	2,055,423	67,822
1913	1,324,735	35,817
1914	1,238,430	46,158
1915	1,496,288	36,851
1916	1,587,923	54,870

Seed, Cotton.

	Pounds.	Dollars.
1912	2,044,144	22,124
1913	3,264,114	56,316
1914	8,891,303	66,035
1915	22,724,868	114,983
1916	30,113,684	251,568

Seed, Cummin.

	Pounds.	Dollars.
1912	616,343	39,305
1913	529,667	27,178
1914	530,550	31,709
1915	694,344	83,534
1916	1,446,006	225,672

Seed, Fennel.

	Pounds.	Dollars.
1912	480,978	18,547
1913	187,665	14,410
1914	207,135	12,299
1915	293,810	13,622
1916	312,927	20,751

Seed, Fenugreek.

	Pounds.	Dollars.
1912	1,594,224	28,620
1913	1,944,407	37,434
1914	1,619,230	29,601
1915	1,484,826	30,295
1916	811,270	29,672

Seed, Flaxseed or Linseed.

	Bushels.	Dollars.
1912	6,859,112	13,016,184
1913	5,274,922	8,118,319
1914	8,652,022	10,571,656
1915	10,373,902	12,983,548
1916	14,637,543	20,151,633

Seed, Millet, Prepared.

		Dollars.
1912	.....	18,530
1913	.....	16,977
1914	.....	26,680
1915	.....	1,790
1916	.....	249

Seed, Mustard.

	Pounds.	Dollars.
1912	12,198,171	419,328
1913	12,719,682	417,370
1914	11,543,941	370,964
1915	10,157,934	543,586
1916	16,402,112	1,070,567

Seed, Poppy.

	Bushels.	Dollars.
1912	44,717	164,804
1913	77,396	237,069
1914	56,322	126,744
1915	52,899	172,018
1916	26,648	176,776

Seed, Rape.

	Pounds.	Dollars.
1912	6,727,169	233,543
1913	4,308,750	169,634
1914	5,970,937	211,301
1915	5,194,132	230,280
1916	9,977,353	311,212

Seed, Soya Bean.

	Pounds.	Dollars.
1914	1,929,435	49,507
1915	3,837,865	87,306
1916	3,003,005	78,963

Not stated prior to 1914.

Selenium and Salts of

		Dollars.
1914	.....	363
1915	.....	43
1916	.....	16

Not stated prior to 1914.

Senna in Leaves.

	Pounds.	Dollars.
1912	3,164,093	154,012
1913	2,634,117	150,535
1914	2,454,172	173,054
1915	2,180,288	209,313
1916	2,794,400	361,881

Sheep Dip.

		Dollars.
1912	.....	22,967
1913	.....	63,527
1914	.....	16,842
1915	.....	32,963
1916	.....	21,198

Sienna and Sienna Earths.

	Pounds.	Dollars.
1912	2,774,351	36,114
1913	3,962,601	57,358
1914	6,489,329	55,925
1915	6,656,031	64,658
1916	5,206,292	83,428

Silver Leaf.

	100 leaves.	Dollars.
1912	24,747	3,116
1913	17,130	2,122
1914	34,070	4,353
1915	31,298	3,718
1916	6,445	802

Slag, Basic, Ground or Unground.

	Tons.	Dollars.
1912	11,751	110,229
1913	5,124	146,477
1914	9,509	108,665
1915	651	7,309
1916	81	1,031

Soap, Castile.

	Pounds.	Dollars.
1912	5,034,504	388,460
1913	4,656,365	357,888
1914	4,904,905	368,310
1915	4,067,921	341,107
1916	3,245,550	335,580

Soap, Medicinal.

	Pounds.	Dollars.
1912	32,731	11,721
1913	42,518	14,734
1914	74,132	29,306
1915	32,048	14,082
1916	16,455	3,623

Soap Powder.

		Dollars.
1914	.....	211
1915	.....	3,362
1916	.....	19,568

Not stated prior to 1914.

Soap, Toilet, Perfumed.

		Dollars.
1912	.....	324,625
1913	.....	324,207
1914	.....	248,194
1915	.....	196,646
1916	.....	147,819

Soap, Toilet, Unperfumed.

		Dollars.
1914	.....	100,650
1915	.....	140,048
1916	.....	82,057

Not stated prior to 1914.

Soap, All Other, Not Specially Provided For.

		Dollars.
1912	.....	73,687
1913	.....	58,526
1914	.....	84,745
1915	.....	53,949
1916	.....	18,245

Soda, Ash.

	Pounds.	Dollars.
1912	2,905,587	33,459
1913	3,100,790	35,461
1914	2,228,981	28,100
1915	2,127,542	29,022
1916	878,175	20,718

Soda, Arsenate of.

	Pounds.	Dollars.
1912	856,491	11,195
1913	1,267,998	55,941
1914	228,270	8,267
1915	85,850	3,188
1916	36,176	3,486

Soda, Benzoate of.

	Pounds.	Dollars.
1914	190	97
1915	40,903	19,183
1916	35,188	100,196

Not stated prior to 1914.

Soda, Bicarbonate of, Etc.

	Pounds.	Dollars.
1912	110,015	3,193
1913	80,699	2,238
1914	88,873	2,224
1915	93,318	2,584
1916	129,414	2,867

Soda, Bichromate and Chromate of.

	Pounds.	Dollars.
1912	.....	.....
1913	9	3
1914	11,056	595
1915	.....	.....
1916	6,154	5,630

Soda, Borate of, or Borax, Refined.

	Pounds.	Dollars.
1914	4,522	641
1915	2,265	314
1916	682	112

Not stated prior to 1914.

Soda, Chlorate of.

	Pounds.	Dollars.
1912	140	22
1913	50	10
1914	469	84
1915	62	6
1916	22,176	3,106

Soda, Crystal Carbonate of.

	Pounds.	Dollars.
1912	354,600	5,616
1913	169,174	2,928
1914	307,488	3,323
1915	144,452	2,748
1916	49,231	889

Soda, Cyanide of.

	Pounds.	Dollars.
1914	7,856,611	1,120,789
1915	6,187,418	955,907
1916	684,196	115,186

Not stated prior to 1914.

Soda, Hydrate of, or Caustic.

	Pounds.	Dollars.
1912	930,616	28,937
1913	671,480	25,364
1914	693,320	23,914
1915	444,185	19,218
1916	225,189	20,981

Soda, Hyposulphite of.

	Pounds.	Dollars.
1912	8,535	277
1913	7,299	228
1914	926,135	128,828
1915	1,855,223	268,096
1916	5,125	166

Soda, Nitrate of.

	Tons.	Dollars.
1912	481,786	15,427,904
1913	586,315	20,717,376
1914	554,048	17,926,165
1915	575,371	16,240,510
1916	1,072,833	32,129,926

Soda, Nitrite of.

	Pounds.	Dollars.
1912	974,667	47,390
1913	1,269,544	57,595
1914	1,844,379	76,813
1915	1,696,567	74,263
1916	2,593,330	170,160

Soda, Phosphate of.

	Pounds.	Dollars.
1912	.....	.....
1913	30	14
1914	1,364,789	24,975
1915	485,300	7,765
1916	1,066	79

Soda, Prussiate of, Yellow.

	Pounds.	Dollars.
1912	1,646,344	90,654
1913	1,887,369	118,475
1914	2,295,724	171,884
1915	1,529,958	120,477
1916	527,130	136,259

Soda, Sal, or Soda Crystals.

	Pounds.	Dollars.
1912	253,634	2,020
1913	128,027	1,010
1914	163,626	1,274
1915	104,800	906
1916	67,210	334

Soda, Silicate of.

	Pounds.	Dollars.
1912	933,236	8,870
1913	1,032,113	9,400
1914	1,046,569	10,881
1915	1,587,902	16,292
1916	1,567,617	18,694

Soda, Sulphid of.

	Pounds.	Dollars.
1912	722,980	10,456
1913	951,864	13,988
1914	2,529,911	36,383
1915	1,263,366	18,228
1916	80,513	4,616

Soda, Sulphite of.

	Pounds.	Dollars.
1912	354,232	4,860
1913	27,152	400
1914	382,540	5,627
1915	165,594	4,816
1916	435	60

Sponges.

		Dollars.
1912	.....	311,547
1913	.....	289,909

Stated separately after 1913.

Sponges, Not Advanced by Chemical Process.

		Dollars.
1914	.....	279,211
1915	.....	334,252
1916	.....	474,626

Sponges, Bleached and Advanced by Chemical Process.

		Dollars.
1914	.....	38,300
1915	.....	42,042
1916	.....	58,797

Starch, Potato.

	Pounds.	Dollars.
1912	14,016,582	405,336
1913	14,180,856	375,713
1914	33,934,741	283,661
1915	10,941,257	253,859
1916	2,337,717	72,736

Starch, Soluble or Chemically Treated.

	Pounds.	Dollars.
1912	407,773	15,356
1913	321,071	13,345
1914	1,697,392	54,604
1915	508,297	21,859
1916	7,420	417

Starch, All Other.

	Pounds.	Dollars.
1912	707,300	37,667
1913	677,786	40,665
1914	962,314	52,100
1915	952,964	52,537
1916	1,242,918	73,833

Stearin, Oleo.

	Pounds.	Dollars.
1912	4,912,710	448,950
1913	9,540,347	967,000
1914	5,679,535	497,973
1915	2,644,490	266,661
1916	910,478	81,280

Steel Wool, or Shavings.

	Pounds.	Dollars.
1912	35,844	7,021
1913	41,436	5,177
1914	27,113	3,698
1915	17,059	2,139
1916	148	26

Stontia, Oxide of.

		Dollars.
1912	.....	.....
1913	.....	474
1914	.....	1,969
1915	.....	7,268
1916	.....	8,311

Strychnia or Strychnine, and Its Combination with Acids Not Subject to Duty.

	Ounces.	Dollars.
1912	1,004,049	3,900,146
1913	966,576	4,112,057
1914	846,905	3,753,879
1915	26,967	11,449
1916	59,278	37,652

Sulphur Ore as Pyrites or Sulphuret of Iron Containing Not in Excess of 25 Per Cent. Sulphur.

	Tons.	Dollars.
1912	305	252
1913	532	377
1914	17,419	5,403
1915	26,967	11,449
1916	1,370,059	7,121,614

Sulphur or Brimstone Crude.

	Tons.	Dollars.
1912	25,545	483,754
1913	19,258	374,024
1914	20,236	346,875
1915	25,842	442,975
1916	22,539	372,599

Sulphur Lac or Precipitated.

	Pounds.	Dollars.
1912	150,952	9,670
1913	715,876	13,723
1914	233,896	13,636
1915	208,568	13,187
1916	217,997	16,628

Sulphur, Refined.

	Tons.	Dollars.
1912	1,393	35,448
1913	1,742	41,626
1914	1,523	59,634
1915	1,296	36,275
1916	850	26,778

Sulphur, Sublimed or Flowers of.

	Tons.	Dollars.
1912	3,921	87,062
1913	6,104	122,093
1914	599	16,841
1915	950	31,202
1916	200	7,512

Sumac, Unground.

	Pounds.	Dollars.
1912	576,869	9,461
1913	621,366	12,420
1914	1,335,596	32,238
1915	1,258,204	32,613
1916	1,131,368	28,164

Sumac, Ground.

	Pounds.	Dollars.
1912	12,642,129	238,887
1913	14,112,112	289,255
1914	9,678,719	231,550
1915	12,048,917	294,434
1916	20,411,022	527,102

Sumac, Extract.

	Pounds.	Dollars.
1912	1,380,733	46,551
1913	1,270,825	44,568
1914	1,463,297	59,022
1915	727,449	35,096
1916	36,003	4,108

Talcum, Ground, Etc.

	Pounds.	Dollars.
1912	20,465,942	117,094
1913	23,660,095	122,628
1914	32,498,066	173,023
1915	30,434,850	187,871
1916	33,738,067	207,179

Talcum, Steatite and French Chalk, Crude.

	Pounds.	Dollars.
1914	2,807,974	23,369
1915	3,478,711	15,322
1916	4,681,165	9,703

Not stated prior to 1914.

Tallow.

	Pounds.	Dollars.
1912	349,381	25,703
1913	490,505	41,710
1914	3,371,853	231,924
1915	12,634,594	823,958
1916	4,779,076	396,787

Tanks, or Vessels, Cylindrical or Tubular, for Holding Gas Liquids or Other Material.

		Dollars.
1912	.....	427,697
1913	.....	499,031
1914	.....	459,842
1915	.....	226,911
1916	.....	242,773

Tapioca, Tapioca Flour, Cassava or Cassady.

	Pounds.	Dollars.
1912	52,493,313	1,499,897
1913	71,356,085	1,955,169
1914	71,504,728	1,590,614
1915	60,080,060	1,324,194
1916	64,838,470	1,902,399

Tar, Coal, Crude, and Pitch of.

	Barrels.	Dollars.
1912	26,908	50,001
1913	14,093	23,691
1914	17,515	25,140
1915	16,391	23,874
1916	19,206	32,636

Tar and Pitch of Wood.

	Barrels.	Dollars.
1912	677	6,227
1913	178	2,777
1914	561	7,946
1915	129	1,551
1916	31	282

Tartrate of Soda or Potassa, or Rochelle Salts.

	Pounds.	Dollars.
1912	86,447	11,270
1913	138,115	16,927
1914	186,305	23,419
1915	253,609	19,244
1916	187	47

Tea, Impure, Waste, Siftings or Sweepings for Manufacturing Purpose.

	Pounds.	Dollars.
1912	5,994,507	161,540
1913	7,168,410	215,938
1914	5,213,956	178,302
1915	4,739,208	153,360
1916	4,796,766	201,507

Terpin Hydrate.

	Pounds.	Dollars.
1914	6,929	1,020
1915	4,477	657
1916	.....	.....

Not stated prior to 1914.

Terra Alba, Not Made from Gypsum or Plaster Rock.

		Dollars.
1912	.....	.....
1913	.....	.....
1914	.....	97
1915	.....	602
1916	.....	.....

Thorium, Nitrate of.

	Pounds.	Dollars.
1912	118,171	230,395
1913	112,105	212,263
1914	144,413	309,260
1915	78,516	186,385
1916	22,261	63,490

Thorium, Oxide and Other Salts of.

	Pounds.	Dollars.
1914	2,465	4,075
1915	82	359
1916	2,612	6,092

Not stated prior to 1914.

Thymol.

	Pounds.	Dollars.
1914	19,045	24,765
1915	4,772	12,921
1916	443	1,973

Not stated prior to 1914.

Tin, Black, Oxide of, or Cassiterite.

	Pounds.	Dollars.
1912	122,693	35,700
1913	82,983	18,536
1914	19,549	3,022
1915	49,068	10,798
1916	40,533	8,134

Tin Foil.

		Dollars.
1912	.....	1,634
1913	.....	430
1914	.....	649
1915	.....	1,216
1916	.....	1,506

Tonka Beans.

	Pounds.	Dollars.
1912	91,024	201,131
1913	783,888	1,140,409
1914	545,156	677,195
1915	132,119	95,222
1916	143,321	94,700

Turmeric.

		Dollars.
1912	.....	32,342
1913	.....	33,735
1914	.....	22,978
1915	.....	10,145
1916	.....	180,948

Turpentine, Spirits of.

	Gallons.	Dollars.
1912	61,910	24,780
1913	56,457	19,295
1914	72,679	28,818
1915	13,680	6,095
1916	20,675	8,252

Turpentine, Venice.

	Pounds.	Dollars.
1912	83,362	9,816
1913	60,678	9,169
1914	112,010	17,434
1915	20,904	3,172
1916	7,901	772

Ultramarine, Dry, in Pulp or Mixed with Water.

	Pounds.	Dollars.
1912	745,091	66,435
1913	695,938	62,250
1914	901,208	78,392
1915	641,381	62,715
1916	401,605	44,709

Umber, Crude, Not Powdered, Washed or Pulverized.

	Pounds.	Dollars.
1912	2,962,166	13,377
1913	5,256,077	29,391
*1914	1,069,059	7,138

* Covers period July 1 to October 3, 1913, only. Stated as "Umber and Umber Earths" after October 3, 1913.

Umber, Powdered, Washed or Pulverized.

	Pounds.	Dollars.
1912	762,772	11,283
1913	817,500	11,217
*1914	151,713	2,478

* Covers period July 1 to October 3, 1913, only. Stated as "Umber and Umber Earths" after October 3, 1913.

Umber, Ground in Oil or Water.

	Pounds.	Dollars.
1912	5,463	399
1913	6,083	380
*1914	2,538	156

* Covers period July 1, to October 3, 1913, only. Stated as "Umber and Umber Earths" after October 3, 1913.

Umber and Umber Earths.

	Pounds.	Dollars.
1914	3,381,919	25,798
1915	7,225,537	36,128
1916	8,914,389	55,076

Included in the three preceding classes prior to 1914.

Uranium, Oxide and Salts of.

		Dollars.
1912	.....	15,024
1913	.....	21,435
1914	.....	5,782
1915	.....	1,969
1916	.....	2,099

Vanilla Beans.

	Pounds.	Dollars
1912	841,639	2,025,153
1913	1,049,617	2,641,574
1914	694,531	1,739,674
1915	749,146	1,839,995
1916	796,890	1,474,228

Valonia.

	Pounds.	Dollars.
1912	1,196,591	24,680
1913	5,295,762	79,610
1914	7,654,056	116,406
1915	6,352,190	88,061
1916	.....	.....

Vanillin.

	Ounces.	Dollars.
1912	.....	.....
1913	880	171
1914	33,668	6,440
1915	451	98
1916	.....	.....

Varnish, Gold Size, or Japan.

		Dollars.
1914	.....	8,706
1915	.....	10,228
1916	.....	423

Not stated prior to 1914.

Varnish Spirit.

	Gallons.	Dollars.
1912	5,272	16,827
1913	1,475	4,078
1914	10,127	24,329
1915	581	1,937
1916	1,318	6,874

Varnish, All Other.

	Gallons.	Dollars.
1912	24,312	48,853
1913	25,093	51,710
1914	16,888	31,932
1915	27,943	51,791
1916	25,542	62,776

Venetian Red.

	Pounds.	Dollars.
1912	2,228,593	18,438
1913	2,989,104	23,649
1914	3,858,611	33,077
1915	2,478,959	20,677
1916	1,687,616	12,947

Verdigris, Acetate and Sub-Acetate of Copper.

	Pounds.	Dollars.
1912	211,339	4,973
1913	55,465	7,053
1914	19,009	2,530
1915	17,569	2,491
1916	81,005	15,648

Vermilion Reds.

	Pounds.	Dollars.
1912	72,076	38,838
1913	85,337	44,753
1914	72,881	34,379
1915	95,659	58,697
1916	71,515	92,990

Wafers, Unleavened, or Not Edible.

		Dollars.
1912	.....	29,598
1913	.....	28,564
1914	.....	32,816
1915	.....	26,556
1916	.....	28,736

Wax, Mineral.

	Pounds.	Dollars.
1912	5,508,862	440,925
1913	6,440,878	507,656
1914	7,974,157	537,684
1915	6,284,757	401,500
1916	2,081,083	141,539

Wash Blue Containing Ultramarine.

	Pounds.	Dollars.
1912	112,234	14,269
1913	97,220	13,332
1914	*	12,906
1915	.....	6,485
1916	.....	4,907

* Quantity not stated after 1913.

Wax, Vegetable.

	Pounds.	Dollars.
1912	4,564,928	1,060,198
1913	5,542,474	1,152,738
1914	4,336,276	1,043,337
1915	5,388,398	999,535
1916	9,594,111	1,551,996

Whalebone, Unmanufactured.

	Pounds.	Dollars.
1912	18,251	44,587
1913	8,993	12,686
1914	9,624	11,781
1915	40,088	68,262
1916	27,855	17,936

White Lead, and All Pigments Containing Lead.

	Pounds.	Dollars.
1912	713,370	46,920
1913	678,078	46,527
1914	656,884	44,436
1915	514,876	35,743
1916	153,474	11,970

Whiting and Paris White, Dry.

	Pounds.	Dollars.
1912	3,729,155	14,578
1913	3,536,747	14,032
1914	2,361,606	10,453
1915	5,387,,038	15,705
1916	3,655,123	14,459

Wicking, Lamp, Stove or Candle, Made of Cotton or Other Vegetable Fiber.

	Pounds.	Dollars.
1912	52,492	17,292
1913	44,653	13,771
1914	47,208	15,988
1915	37,932	11,758
1916	20,074	5,105

Witherite.

	Pounds.	Dollars.
1912	2,205,896	16,476
1913	2,109,842	15,224
1914	1,223,926	7,927
1915	838,292	6,674
1916	1,714,414	20,446

Wood Flour.

	Pounds.	Dollars.
1912	6,365,375	30,802
1913	11,795,852	62,447
1914	15,171,972	84,751
1915	11,482,934	60,131
1916	13,731,979	74,479

Zinc Bearing Ores, Including Calamine.

	Tons, gross weight.	Zinc contents, pounds.	Dollars.
1912	6,244	3,769,255	79,464
1913	27,481	12,584,528	526,173
1914	14,402	11,762,861	169,986
1915	17,341	14,259,176	321,135
1916	86,611	81,779,564	3,376,166

Zinc, Chloride of.

	Pounds.	Dollars.
1912	1,182,441	33,133
1913	1,252,319	37,078
1914	789,296	23,503
1915	194,250	5,805
1916	12,643	463

Zinc Dust.

	Pounds.	Dollars.
1912	3,705,742	202,740
1913	6,615,766	317,492
1914	4,788,433	223,775
1915	2,278,533	132,822
1916	1,365,705	255,192

Zinc, Oxide, Dry.

	Pounds.	Dollars.
1912	4,842,948	310,362
1913	6,148,120	389,485
*1914	1,408,162	88,410

* Figures are for July 1 to Otober 3, 1913. Stated separately after October 3, 1913.

Zinc, Oxide of, Ground Dry.

	Pounds.	Dollars
1914	5,315,807	309,106
1915	2,565,434	148,143
1916	1,441,299	244,934

Zinc, Oxide of, Ground in or Mixed with Oil or Water.

	Pounds.	Dollars.
1914	292,571	21,595
1915	156,451	11,525
1916	66,347	7,187

Zinc Sulphate.

	Pounds.	Dollars.
1912	76,890	2,983
1913	23,778	817
1914	107,065	2,176
1915	68,940	1,027
1916	.....	.....

Zinc, Sulphide of, White.

	Pounds.	Dollars.
1912	6,325,072	157,921
1913	5,163,642	144,812
1914	1,338,999	42,130
1915	283,356	8,979
1916	96,402	7,368

DOMESTIC EXPORTS FROM THE UNITED STATES.

Fiscal Years Ending June 30.

Acid, Sulphuric.

	Pounds.	Dollars.
1912	7,002,444	71,877
1913	9,790,532	89,785
1914	12,131,750	125,892
1915	46,771,510	516,436
1916	82,020,246	1,990,532

Acids, All Other.

		Dollars.
1912	.....	364,207
1913	.....	364,347
1914	.....	357,035
1915	.....	2,611,741
1916	.....	22,717,335

Alcohol, Wood.

	Proof gallons.	Dollars.
1912	1,565,368	685,565
1913	1,837,173	788,143
1914	1,598,776	652,486
1915	944,374	438,846
1916	1,472,258	857,161

Alcohol, All Other, Including Pure, Neutral or Cologne Spirit.

	Proof gallons.	Dollars.
1912	25,440	11,336
1913	151,232	58,346
1914	187,845	67,728
1915	200,455	108,985
1916	24,433,243	8,784,742

Asphaltum, Unmanufactured.

	Tons.	Dollars.
1912	32,001	707,997
1913	54,560	1,164,486
1914	49,831	1,131,086
1915	28,553	616,240
1916	42,754	830,946

Asphaltum, Manufactured.

		Dollars.
1912	.....	462,885
1913	.....	475,541
1914	.....	362,347
1915	.....	400,154
1916	.....	510,290

Baking Powder.

	Pounds.	Dollars.
1912	2,615,138	750,748
1913	2,844,575	844,826
1914	2,725,994	790,274
1915	3,376,780	881,879
1916	3,969,985	860,118

Bark, Extract of, for Tanning.

		Dollars.
1912	.....	404,024
1913	.....	524,063
1914	.....	639,941
1915	.....	2,226,457
1916	.....	5,902,799

Bark, for Tanning.

	Tons.	Dollars.
1912	2,095	57,319
1913	1,683	46,499
1914	1,212	26,939
1915	825	21,424
1916	5,226	123,675

Beeswax.

	Pounds.	Dollars.
1912	109,478	32,556
1913	116,296	33,131
1914	96,215	27,292
1915	181,328	57,971
1916	147,772	48,252

Bones.

		Dollars.
1913	.....	77,576
1914	.....	47,651
1915	.....	34,796
1916	.....	42,186

Not stated prior to 1913.

Calcium, Carbide.

	Pounds.	Dollars.
1912	32,307,802	936,609
1913	33,419,375	990,027
1914	32,846,649	962,040
1915	35,772,867	1,097,952
1916	37,873,692	1,211,267

Candles.

	Pounds.	Dollars.
1912	2,782,439	255,075
1913	2,595,912	246,274
1914	3,047,736	283,018
1915	4,230,026	417,346
1916	6,120,695	575,659

Celluloid and Manufactures of.

		Dollars.
1912	.....	2,034,371
1913	.....	1,639,046
1914	.....	1,387,541
1915	.....	722,850
1916	.....	2,328,142

Cement, Hydraulic.

	Barrels (380 lbs.)	Dollars.
1912	3,423,747	5,083,046
1913	3,999,715	5,822,107
1914	2,391,453	2,382,282
1915	2,361,451	3,241,686
1916	2,740,596	3,780,564

Chalk.

		Dollars.
1912	.....	56,414
1913	.....	49,478
1914	.....	40,154
1915	.....	51,175
1916	.....	60,417

Charcoal.

		Dollars.
1912	.....	45,726
1913	.....	73,030
1914	.....	81,997
1915	.....	105,099
1916	.....	94,096

Chewing Gum.

		Dollars.
1912	.....	164,311
1913	.....	186,944
1914	.....	178,630
1915	.....	281,433
1916	.....	574,423

Coal Tar.

	Barrels.	Dollars.
1912	22,676	59,390
1913	121,168	152,273
1914	22,150	43,145
1915	21,317	39,647
1916	74,809	129,220

Copper, Pigs, Ingots, and Bars.

	Pounds.	Dollars.
1913	740,340,312	120,665,914
1914	864,602,721	128,137,408
1915	581,773,537	81,946,522

Not separately stated prior to 1913; subdivided after 1915.

Copper, Rods and Wire.

	Pounds.	Dollars.
1913	41,459,901	7,217,166
1914	32,503,236	5,298,685
1915	53,505,157	8,004,628

Not separately stated prior to 1913, nor after 1915.

Copper, Unrefined, Black, Blister and Converted Copper in Bars, Pigs or Other Forms.

	Pounds.	Dollars.
1916	4,921,089	1,137,770

Not separately stated prior to 1916.

Copper, Refined, in Ingots, Bars, Rods or Other Forms.

	Pounds.	Dollars.
1916	657,891,844	147,809,793

Not separately stated prior to 1916.

Copper, Old and Scrap.

	Pounds.	Dollars.
1916	312,584	66,020

Not separately stated prior to 1916.

Copper, Plates and Sheets.

	Pounds.	Dollars.
1913	61,050,138	10,028,960
1914	71,855,735	10,690,504
1915	34,355,789	5,103,778
1916	24,091,274	5,268,736

Not separately stated prior to 1913.

Copper, Wire.

	Pounds.	Dollars.
1916	24,369,832	5,208,750

Not separately stated prior to 1916.

Copper, Sulphate of.

	Pounds.	Dollars.
1912	5,401,928	287,481
1913	5,052,680	262,561
1914	7,375,775	330,007
1915	10,238,808	445,580
1916	17,978,242	2,469,437

Cork, Manufactures of.

		Dollars.
1912	.....	294,046
1913	.....	339,436
1914	.....	.....
1915	.....	211,795
1916	.....	455,424

Dyes and Dyestuffs.

		Dollars.
1912	.....	314,694
1913	.....	347,656
1914	.....	356,919
1915	.....	1,775,925
1916	.....	5,102,002

Egg Yolks, Canned Eggs, Etc.

		Dollars.
1912	.....	29,541
1913	.....	67,854
1914	.....	47,968
1915	.....	88,865
1916	.....	210,255

Emery and Other Abrasive Wheels.

		Dollars.
1913	.....	809,720
1914	.....	665,778
1915	.....	736,879
1916	.....	1,630,265

Not separately stated prior to 1913.

Fertilizers, Phosphate Rock, Ground or Unground, Not Acidulated.

	Tons.	Dollars.
1912	1,212,957	8,982,954

Stated separately after 1912; see following classes.

Fertilizers, Phosphate High-Grade Hard Rock.

	Tons.	Dollars.
1913	494,200	4,942,000
1914	475,335	4,753,350
1915	46,050	460,050
1916	44,330	429,130

Fertilizers, Phosphate Rock, Land Pebble.

	Tons.	Dollars.
1913	777,898	4,577,962
1914	1,000,630	5,857,969
1915	222,472	1,276,759
1916	235,206	1,324,877

Fertilizers, Phosphate Rock, All Other.

	Tons.	Dollars.
1913	794	4,127
1914	1,906	6,516
1915	887	5,888
1916	466	8,947

Fertilizers, All Other.

	Tons.	Dollars.
1912	63,563	1,890,794
1913	74,834	1,875,999
1914	61,601	1,360,963
1915	89,224	2,128,190
1916	124,979	3,580,543

Flavoring Extracts and Fruit Juices.

		Dollars.
1912	.....	173,402
1913	.....	133,990
1914	.....	106,892
1915	.....	136,742
1916	.....	466,914

Fly Paper.

		Dollars.
1912	.....	181,260
1913	.....	178,175
1914	.....	217,857
1915	.....	115,921
1916	.....	75,155

German Silver.

		Dollars.
1912	.....	56,319
1913	.....	65,362
1914	.....	38,691
1915	.....	30,699
1916	.....	273,828

Ginseng.

	Pounds.	Dollars.
1912	155,308	1,119,301
1913	221,901	1,665,731
1914	224,605	1,832,686
1915	105,184	919,931
1916	256,082	1,597,508

Glass Bottles, Vials, Demijohns, Carboys and Jars.

		Dollars.
1913	.....	808,327
1914	.....	711,353
1915	.....	772,427
1916	.....	2,168,244

Not separately stated prior to 1913.

Glass, Cylinder, Crown and Common Window.

	Boxes (50 sq. ft.)	Dollars.
1912	.....	114,109
1913	.....	434,361
1914	.....	311,339
1915	489,288	1,443,113
1916	894,793	3,123,916

Quantity not stated prior to 1915.

Glass, Plate.

	Square feet.	Dollars.
1912	222,206	50,754
1913	165,129	58,830
1914	74,867	35,767
1915	2,730,046	831,727
1916	5,149,512	1,568,181

Glass, All Other.

		Dollars.
1912	.....	3,329,290
1913	.....	2,892,124
1914	.....	2,671,164
1915	.....	2,511,450
1916	.....	5,460,997

Glucose.

	Pounds.	Dollars.
1912	126,395,045	2,911,736
1913	156,365,604	3,682,371
1914	162,680,378	3,766,284
1915	125,452,878	3,103,561
1916	148,523,098	3,772,860

Glue.

	Pounds.	Dollars.
1912	3,059,952	314,909
1913	2,544,932	276,619
1914	2,351,770	258,611
1915	2,874,225	298,136
1916	4,946,298	531,329

Grape Sugar.

	Pounds.	Dollars.
1912	44,761,214	1,005,161
1913	41,783,642	970,025
1914	36,850,496	799,635
1915	33,027,630	781,672
1916	37,863,084	962,101

Grease, Lubricating.

		Dollars.
1912	.....	2,193,363
1913	.....	2,339,015
1914	.....	2,304,918
1915	.....	2,336,395
1916	.....	3,904,436

Grease, Soap Stock and Other.

		Dollars.
1912	.....	4,486,329
1913	.....	4,844,342
1914	.....	5,046,959
1915	.....	4,266,097
1916	.....	3,156,568

Hair, Unmanufactured.

		Dollars.
1913	.....	1,449,157
1914	.....	1,085,038
1915	.....	1,402,189
1916	.....	2,038,838

Honey.

		Dollars.
1912	.....	212,652
1913	.....	182,252
1914	.....	135,669
1915	.....	114,038
1916	.....	262,487

Hoofs, Horns, Horn Tips, Strips and Waste.

		Dollars.
1913	.....	102,705
1914	.....	61,180
1915	.....	16,162
1916	.....	37,558

Not stated prior to 1913.

Hops.

	Pounds.	Dollars.
1912	12,190,663	4,648,505
1913	17,591,195	4,764,713
1914	24,262,896	6,953,529
1915	16,210,443	3,948,020
1916	22,409,818	4,383,929

Iron, Pig.

	Tons.	Dollars.
1912	185,985	2,658,425
1913	287,022	4,141,210
1914	201,995	2,859,830
1915	130,594	2,071,308
1916	284,728	5,846,989

Lard.

	Pounds.	Dollars.
1912	532,255,865	52,090,441
1913	619,025,384	58,187,336
1914	481,457,792	54,402,911
1915	475,531,908	52,440,133
1916	427,011,338	47,634,376

Lard Compounds and Other Substitutes for Lard.

	Pounds.	Dollars.
1912	62,522,888	5,183,689
1913	67,456,332	5,915,759
1914	58,303,564	5,486,139
1915	69,980,614	6,045,752
1916	52,843,311	5,147,434

Lard, Neutral.

	Pounds.	Dollars.
1912	62,317,909	6,655,009
1913	44,777,602	3,129,699
1914	29,323,786	3,270,286
1915	26,021,054	3,022,821
1916	34,426,590	4,050,397

Lead, Pigs and Bars.

	Pounds.	Dollars.
1914	40,323,662	1,511,800
1915	193,024,221	7,926,604

Stated as following classes after 1915.

Lead, Pigs and Bars, Produced from Domestic Ore.

	Pounds.	Dollars.
1916	153,941,629	9,190,302

Lead, Pigs and Bars, Produced from Foreign Ore.

	Pounds.	Dollars.
1916	52,263,948	2,114,992

Lime.

	Barrels.	Dollars.
1912	228,014	175,368
1913	284,685	214,543
1914	285,749	200,437
1915	169,078	117,644
1916	258,538	143,182

Lime, Acetate.

	Pounds.	Dollars.
1912	69,235,415	1,592,785
1913	80,579,838	2,221,427
1914	68,180,224	1,560,933
1915	24,673,247	486,405
1916	18,804,972	961,645

Malt.

	Bushels.	Dollars.
1912	76,696	86,323
1913	370,957	300,480
1914	330,608	270,059
1915	2,153,090	2,301,535
1916	3,682,248	3,881,700

Medical and Surgical Instruments.

		Dollars.
1913	.....	222,256
1914	.....	206,421
1915	.....	560,741
1916	.....	355,170

Not stated prior to 1913.

Medicines, Patent or Proprietary.

		Dollars.
1912	.....	7,541,650
1913	.....	7,110,403
1914	.....	6,721,978
1915	.....	7,130,379
1916	.....	8,397,971

Metal Polish.

		Dollars.
1912	.....	139,608
1913	.....	127,898
1914	.....	162,504
1915	.....	167,277
1916	.....	225,783

Mucilage.

		Dollars.
1912	.....	29,739
1913	.....	26,238
1914	.....	26,182
1915	.....	14,504
1916	.....	30,149

Oakum.

	Pounds.	Dollars.
1912	1,454,156	65,467
1913	1,458,128	66,614
1914	1,260,681	57,205
1915	1,018,286	51,081
1916	1,328,951	89,740

Oil Cake, Corn.

	Pounds.	Dollars.
1912	72,490,021	1,035,291
1913	76,262,845	1,131,330
1914	59,030,623	909,407
1915	45,026,125	798,206
1916	18,996,490	297,041

Oil Cake, Cottonseed.

	Pounds.	Dollars.
1912	1,293,690,138	17,325,858
1913	1,128,092,367	15,225,798
1914	799,974,252	11,007,441
1915	1,222,609,889	15,432,126
1916	980,664,572	14,749,489

Oil Cake, Flaxseed or Linseed.

	Pounds.	Dollars.
1912	596,114,536	9,735,022
1913	838,119,654	12,982,423
1914	662,868,039	9,650,370
1915	524,794,434	9,048,061
1916	640,916,204	11,935,130

Oil Cake, All Other.

	Pounds.	Dollars.
1912	8,924,033	132,534
1913	6,886,270	104,701
1914	8,484,936	100,445
1915	9,900,878	126,414
1916	28,876,367	410,166

Oilcake Meal, Cottonseed.

	Pounds.	Dollars.
1915	256,365,126	3,474,244
1916	77,256,997	1,149,478

Not stated prior to 1915.

Oil, Animal, Fish, Except Whale.

	Gallons.	Dollars.
1912	1,198,835	361,138
1913	1,901,953	501,227
1914	448,366	125,575
1915	88,880	29,802
1916	146,643	60,411

Oil, Animal, Lard.

	Gallons.	Dollars.
1912	207,337	147,766
1913	154,983	113,665
1914	110,199	87,364
1915	104,019	111,637
1916	419,969	308,642

Oil, Animal, Oleo.

	Pounds.	Dollars.
1912	126,467,124	13,434,018
1913	92,849,757	10,866,253
1914	97,017,065	10,156,665
1915	80,481,496	9,341,188
1916	102,645,914	12,519,115

Oil, Animal, Not Otherwise Specified.

	Gallons.	Dollars.
1912	1,019,412	754,342
1913	1,603,325	970,717
1914	891,035	609,294
1915	559,197	406,636
1916	655,587	492,964

Oils, Mineral, Crude.

	Gallons.	Dollars.
1912	208,110,365	6,831,367
1913	195,642,935	7,750,767
1914	146,477,342	6,812,672
1915	152,514,129	4,911,634
1916	163,734,200	5,754,279

Oil, Mineral, Illuminating.

	Gallons.	Dollars.
1912	1,044,049,848	59,845,823
1913	1,048,894,297	66,189,236
1914	1,157,288,310	74,506,162
1915	886,316,740	53,607,082
1916	823,164,882	54,288,788

Oil, Mineral, Lubricating and Heavy Paraffin.

	Gallons.	Dollars.
1912	202,125,197	25,970,271
1913	213,671,499	29,574,410
1914	196,884,696	27,852,959
1915	214,429,099	28,499,786
1916	350,392,768	37,451,607

Oils, Mineral, Naphthas, Etc., Gasoline.

	Gallons.	Dollars.
1913	81,698,917	10,831,490
1914	151,611,537	21,699,475
1915	156,860,686	17,603,317
1916	100,148,554	16,297,561

Not separately stated prior to 1913.

Oils, Mineral, Naphthas, Etc., All Other.

	Gallons.	Dollars.
1913	101,821,572	14,269,878
1914	40,840,730	5,653,210
1915	94,335,128	10,296,928
1916	194,644,803	29,472,233

Not separately stated prior to 1913.

Oils, Mineral, Residuum, Etc., Gas Oil and Fuel Oil.

	Gallons.	Dollars.
1914	475,143,205	13,747,863
1915	672,931,878	18,543,976
1916	897,853,433	24,770,296

Not separately stated prior to 1913.

Oils, Mineral, Residuum, Etc., Gas Oil and Fuel for Vessels Engaged in Foreign Trade.

	Barrels.	Dollars.
1915	2,898,303	2,567,017
1916	4,552,822	3,195,803

Not stated prior to 1915.

Oils, Mineral, Residuum, Etc., All Other.

	Gallons.	Dollars.
1913	27,513,568	496,237
1914	113,370,245	1,907,715
1915	9,962,970	220,552
1916	13,539,443	388,466

Oil, Corn.

	Pounds.	Dollars.
1912	23,866,146	1,526,931
1913	19,739,622	1,202,009
1914	18,281,576	1,307,204
1915	17,789,635	1,302,159
1916	8,967,826	770,076

Oil, Cottonseed.

	Pounds.	Dollars.
1912	399,470,973	24,089,223
1913	315,232,892	20,736,972
1914	192,963,079	13,843,179
1915	318,366,525	21,872,948
1916	266,529,900	22,659,904

Oil, Linseed.

	Gallons.	Dollars.
1912	246,965	208,591
1913	1,733,925	874,461
1914	239,198	134,540
1915	1,212,133	660,069
1916	714,120	479,231

Oils, Vegetable, All Other Fixed or Expressed.

		Dollars.
1912	.....	339,391
1913	.....	420,368
1914	.....	338,066
1915	.....	1,198,852
1916	.....	2,230,002

Oil, Peppermint.

	Pounds.	Dollars.
1912	155,740	422,631
1913	144,663	395,551
1914	117,800	397,050
1915	184,981	384,593
1916	154,096	323,070

Oils, Vegetable, All Other, Volatile.

		Dollars.
1912	.....	322,164
1913	.....	325,040
1914	.....	230,557
1915	.....	413,104
1916	.....	705,037

Oleomargarine, Imitation Butter.

	Pounds.	Dollars.
1912	3,627,425	372,567
1913	2,987,582	311,485
1914	2,532,821	263,453
1915	5,252,183	617,035
1916	5,426,221	640,480

Paints, Dry Colors, Lampblack.

		Dollars.
1912	.....	907,623
1913	.....	505,748
1914	.....	421,548
1915	.....	363,825
1916	.....	521,463

Paints, Dry Colors, All Other.

		Dollars.
1913	.....	785,907
1914	.....	690,836
1915	.....	1,072,736
1916	.....	1,591,913

Not stated prior to 1913.

Paints, Ready Mixed.

	Gallons.	Dollars.
1913	961,945	1,211,580
1914	852,910	1,096,336
1915	703,494	884,700
1916	1,099,731	1,384,226

Not stated prior to 1913.

Paints, White Lead.

	Pounds.	Dollars.
1913	15,736,488	944,205
1914	16,845,154	1,013,806
1915	19,700,810	1,070,646
1916	29,125,449	1,861,730

Not stated prior to 1913.

Paints Not Elsewhere Specified, Including Crayons.

		Dollars.
1912	.....	3,864,397
1913	.....	1,802,049
1914	.....	1,779,863
1915	.....	1,827,494
1916	.....	3,259,539

Paraffin and Paraffin Wax.

	Pounds.	Dollars.
1912	249,502,699	8,123,486
1913	290,678,861	9,679,273
1914	186,357,728	6,516,338
1915	320,374,056	10,589,843
1916	360,650,114	12,873,250

Paste.

		Dollars.
1912	.....	56,790
1913	.....	69,032
1914	.....	68,831
1915	.....	91,522
1916	.....	298,537

Perfumeries, Cosmetics and All Toilet Preparations.

		Dollars.
1912	.....	1,147,680
1913	.....	1,441,982
1914	.....	1,620,872
1915	.....	1,715,059
1916	.....	2,903,063

Petroleum Jelly.

		Dollars.
1913	.....	536,637
1914	.....	661,880
1915	.....	838,842
1916	.....	1,099,315

Not stated prior to 1913.

Plaster of Paris.

		Dollars.
1912	.....	20,830
1913	.....	15,723
1914	.....	14,799
1915	.....	12,353
1916	.....	12,436

Platinum, Unmanufactured.

	Ounces, troy.	Dollars.
1912	1,710	70,789
1913	1,299	57,071
1914	273	12,977
1915	1,397	53,266
1916	1,083	92,388

Platinum, Manufactures of.

		Dollars.
1912	.....	108,105
1913	.....	126,013
1914	.....	71,172
1915	.....	27,101
1916	.....	82,929

Plumbago or Graphite, Unmanufactured.

	Pounds.	Dollars.
1912	3,935,884	285,597
1913	4,503,569	321,679
1914	5,376,880	387,075
1915	2,324,081	152,446
1916	936,869	46,807

Plumbago or Graphite, Manufactures of.

		Dollars.
1912	.....	167,299
1913	.....	175,583
1914	.....	269,499
1915	.....	368,333
1916	.....	845,729

Quicksilver.

	Pounds.	Dollars.
1912	24,231	14,517
1913	40,410	21,885
1914	64,190	32,241
1915	222,927	155,089
1916	232,763	272,086

Roofing Felt.

		Dollars.
1912	.....	1,208,957
1913	.....	1,427,695
1914	.....	1,029,127
1915	.....	880,944
1916	.....	1,552,535

Roots, Herbs and Barks, Crude, Not Mixed.

		Dollars.
1912	.....	549,877
1913	.....	424,312
1914	.....	513,071
1915	.....	470,690
1916	.....	763,977

Rosin.

	Barrels.	Dollars.
1912	2,474,460	16,462,850
1913	2,806,046	17,359,145
1914	2,417,950	11,217,316
1915	1,372,316	6,220,321
1916	1,571,279	8,874,313

Salt.

	Pounds.	Dollars.
1912	111,008,906	383,062
1913	128,035,915	441,673
1914	148,931,265	542,783
1915	165,619,386	616,132
1916	165,627,801	600,648

Seed, Cotton.

	Pounds.	Dollars.
1912	64,060,276	727,100
1913	24,048,647	328,988
1914	16,342,384	215,115
1915	6,314,439	94,237
1916	2,475,907	37,811

Seed, Flax.

	Bushels.	Dollars.
1912	4,323	12,160
1913	16,894	26,690
1914	305,546	436,874
1915	4,145	9,748
1916	2,614	6,501

Soap, Toilet or Fancy.

		Dollars.
1912	.....	1,840,037
1913	.....	2,132,663
1914	.....	2,141,633
1915	.....	1,777,342
1916	.....	2,610,481

Soap, Except Toilet or Fancy.

	Pounds.	Dollars.
1912	57,855,457	2,695,091
1913	61,292,554	2,496,904
1914	58,547,763	2,797,369
1915	63,367,750	3,080,057
1916	75,548,086	3,700,277

Spermaceti.

	Pounds.	Dollars.
1912	35,470	8,256
1913	216,629	44,744
1914	65,414	13,303
1915	167,385	21,522
1916	72,562	11,387

Spices.

		Dollars.
1912	.....	74,023
1913	.....	92,962
1914	.....	84,427
1915	.....	76,297
1916	.....	250,827

Sponges.

	Pounds.	Dollars.
1912	154,287	146,416
1913	205,804	177,059
1914	209,476	173,866
1915	117,618	109,635
1916	197,826	165,884

Starch.

	Pounds.	Dollars.
1912	83,644,749	1,965,401
1913	110,987,591	2,609,716
1914	76,713,779	1,825,230
1915	107,036,638	2,939,453
1916	210,185,192	5,576,914

Sulphur or Brimstone, Crude.

	Tons.	Dollars.
1912	41,269	784,349
1913	73,861	1,353,310
1914	110,022	2,018,724
1915	48,391	885,756
1916	68,796	1,329,802

Surgical Appliances (Not Including Instruments).

		Dollars.
1913	.....	973,733
1914	.....	1,228,467
1915	.....	4,418,303
1916	.....	3,166,718

Not stated prior to 1913.

Tallow. (This is Beef Tallow.)

	Pounds.	Dollars.
1912	39,451,419	2,388,046
1913	30,586,300	1,910,439
1914	15,812,831	1,002,011
1915	20,239,988	1,386,445
1916	16,288,743	1,326,472

Tar, Turpentine and Pitch.

	Barrels.	Dllars.
1912	50,107	223,002
1913	62,346	317,491
1914	351,352	568,891
1915	239,661	430,612
1916	67,616	291,939

Tripoli.

		Dollars.
1912	.....	47,333

Not stated after 1912.

Spirits of Turpentine.

	Gallons.	Dollars.
1912	19,599,241	10,060,135
1913	21,039,597	8,794,656
1914	18,990,704	8,095,958
1915	9,464,120	4,476,306
1916	9,300,968	4,337,355

Varnish.

	Gallons.	Dollars.
1912	1,114,413	1,118,004
1913	1,279,777	1,267,860
1914	1,069,501	1,038,864
1915	731,604	682,352
1916	846,362	838,339

Washing Powder and Fluid.

	Founds.	Dollars.
1912	8,287,197	392,573
1913	9,923,700	456,762
1914	12,761,958	535,635
1915	14,695,317	635,476
1916	7,875,317	355,926

Whalebone.

	Pounds.	Dollars.
1912	49,074	121,609
1913	106,174	182,938
1914	35,034	58,165
1915	28,111	32,643
1916	44,924	53,400

Zinc Dross.

	Pounds.	Dollars.
1912	3,866,317	168,381
1913	102,569	3,271
1914	572,477	29,084
1915	10,361,840	557,247
1916	2,526,288	164,649

Zinc Ore.

	Tons.	Dollars.
1912	19,968	787,013
1913	17,308	687,680
1914	14,294	559,785
1915	3,345	138,071
1916	168	12,277

Zinc, Oxide of.

	Pounds.	Dollars.
1912	32,792,882	1,182,683
1913	31,045,147	1,164,589
1914	29,197,790	1,215,360
1915	37,580,411	1,808,970
1916	31,272,278	1,960,604

REVISED LONDON TURPENTINE PRICES.

Below is a table showing the course of prices of American turpentine (with stocks) in London since July, 1915.

The figures are those of the first Saturday of each month:—

1915-16.	s.	d.	Barrels.
July	38	0	14,666
August	34	9	27,809
September	34	1½	34,739
October	35	0	32,847
November	42	6	44,323
December	46	0	39,254
January	54	0	32,678
February	50	0	33,252
March	47	6	28,273
April	51	0	29,524
May	43	0	24,069
June	42	6	25,220
1916.			
July	38	6	17,997
August	41	9	19,598
September	42	6	24,007
October	43	1½	16,823
November 2	44	4½	12,800

Basic Sulphate White Lead Prices.

The following table shows hte price of basic sulphate white lead for each month last year:—

	Cents per pound.
January	6 @6¼
February	6¼
March	6¼@8¾
April	8¾
May	8¾
June	8¾
July	8¾
August	8¾
September	8¾
October	8¾
November	8¼@8¾
December	8¼

Chicago Flaxseed Receipts and Shipments.

Monthly receipts of flaxseed at Chicago during the calendar year 1916, with comparisons of the year 1915, follow:—

	1916.	1915.
January	36,000	31,000
February	30,000	21,000
March	54,000	5,000
April	38,000	.....
May	204,000	4,000
June	.....	137,000
July	19,000	1,000
August	57,000	1,000
September	188,000	261,000
October	158,000	207,000
November	176,000	126,000
December	265,000	448,000
Totals	1,225,000	1,292,000

Monthly shipments of flaxseed from Chicago during the calendar year 1916, with comparisons for the year 1915, follow:—

	1916.	1915.
January	.....	8,000
February	1,000	1,000
March	2,000	3,000
April	1,000	.....
May	8,000	2,000
June	.....	10,000
July	.....	2,000
August	.....	.....
September	1,000	.....
October	.....	4,000
November	1,000	1,000
December	1,000	14,000
Totals	27,000	33,000

HIGH AND LOW QUOTATIONS PETROLEUM SECURITIES IN N. Y. DURING THE YEAR 1916

The following table shows the high and low quotations for petroleum securities during 1916, the month of December and the bid and asked prices on January 3, 1917:—

	1916		December		January 3	
	High.	Low.	High.	Low.	Bid.	Ask.
Anglo-American Oil Co.	$18	$14¾	$17¾	$16¼	$17¼	$18
Atlantic Refining Co.	1010	620	1005	935	995	1000
Borne-Scrymser Co.	530	275	480	470	475	500
Buckeye Pipe Line Co.	125	85	124	107	114	116
Chesebrough Manufacturing Co.	500	302	460	440	440	460
Continental Oil Co.	590	270	576	530	540	560
Crescent Pipe Line Co.	48	30	45	40	42	45
Cumberland Pipe Line Co.	158	45	158	150	135	145
Eureka Pipe Line Co.	260	200	230	225	225	230
Galena Signal, common	206	148	197	185	186	190
Galena Signal, preferred	147	134	140	140	142	145
Illinois Pipe Line Co.	255	155	255	220	233	236
Indiana Pipe Line Co.	117	87	115	111	109	112
National Transit Co.	35	13	20½	19	18½	19½
New York Transit Co.	235	170	228	224	220	225
Northern Pipe Line Co.	122	92	120	110	105	110
Ohio Oil Co.	400	190	400	375	394	397
Prairie Oil and Gas Co.	655	360	655	540	600	610
Prairie Pipe Line Co.	353	205	350	328	327	330
Solar Refining Co.	415	270	380	367	360	370
Southern Pipe Line Co.	230	187	225	210	216	220
South Penn Oil Co.	625	308	625	555	585	595
S. W. Penna. Pipe Lines	130	102	116	114	118	121
Standard Oil Co. of California	387	232	383	335	364	368
Standard Oil Co. of Indiana	895	490	875	790	815	825
Standard Oil Co. of Kansas	575	430	554	550	575	590
Standard Oil Co. of Kentucky	810	325	820	700	770	790
Standard Oil Co. of Nebraska	585	335	...	...	560	570
Standard Oil Co. of New York	285	190	286	250	269	272
Standard Oil Co. of New Jersey	715	494	710	660	703	708
Standard Oil Co. of Ohio	463	311	...	...	445	455
Swan & Finch Company	155	96	130	135	115	120
Union Tank Line Co.	103	79	101	96	93	95
Vacuum Oil Co.	400	215	399	370	385	390
Washington Oil Co.	55	22	...	...	40	45
Pierce Oil Corporation	17	10¾	...	...	13½	14½
Penn.-Mex. Fuel Co.	72	54	62	58	59	62
Imperial Oil Co.	250	175	...	...	300	...
International Petroleum Co.	14	9½	10¾	10¼	10¼	11
Cosden & Co.	27	13½	...	...	17⅞	18
Cosden Oil and Gas Co.	18¾	6⅛	...	...	14¾	15
Gulf Oil Corporation	...	...	...	...	300	330
Houston Oil Co.	25	18	22	19	20	22
Magnolia Petroleum Co.	...	...	...	...	300	...
Midwest Refining Co.	86	52	82	79	80	82
Oklahoma Prod. and Refining Co.	13⅜	5⅜	...	...	11¼	11⅜
Sapulpa Refining Co.	16	7	9½	9	9½	10
Sinclair Oil and Refining Co.	66½	37½	...	...	61	61½
Magnolia Petroleum Bonds	...	...	...	...	101	101½
Cosden & Co., 6s	...	...	...	...	104	105
Sinclair Oil, 6s	...	...	...	...	115	117
Pierce Oil, 6s	...	...	...	...	82	84

Necrological Record for the Year 1916.

The necrological record for the year 1916 is a long one, many men prominent in the trades and industries represented in the Reporter being included. A brief sketch of the life and business career of each was published in the Reporter. In the following summary appear the names, date of death, age and date of the issue of the Reporter in which the obituaries appeared:—

	Age.	Date of publication.
Ackley, Ira Elmer, Jan. 12	..	Jan. 24
Allen, Edward E., March 10	61	Mar. 20
Allison, Jo W., Jr., Jan. 29	26	Apr. 3
Bennett, Edwin B., April 7	71	Apr. 10
Beman, H. Clay, June 10	70	June 19
Black, Stephen H., Jan. 4	54	Jan. 10
Bowker, William H., Jan. 4	65	Jan. 10
Buchanan, Charles J., Jan. 7	73	Jan. 10
Catlin, Charles A., April 12	66	Apr. 17
Clay, John, April 26	75	May 1
Colton, George W., June 22	86	June 26
Courter, Albert C., Feb. 22	..	Feb. 28
Dohmen, Henry, Feb. 23	55	Mar. 13
Drake, Mrs. Laura Dow, May 17	..	May 29
Green, David F., April 23	48	May 1
Gregg, William H., Jan. 14	85	Jan. 24
Hagee, William Price, Feb. 3	64	Feb. 21
Haines, C. H., March 7	64	Mar. 13
Hale, Frank A., March 20	64	Apr. 3
Harkness, Charles W., May 1	56	May 8
Hefert, John, June 7	54	June 12
Hoffman, Wm. H., April 21	49	May 8
Johnston, Richard Stephen, Jan. 15	55	Jan. 24
Levinstein, Ivan, March 13	70	Mar. 20
Mapes, Chas. V., Jan. 21	79	Jan. 31
McConnell, Charles H., March 17	75	Mar. 20
McLaughlin, Thos. A., Mar. 19	76	Feb. 28
McPhee, Charles D., Feb. 11	..	Feb. 21
Morningstar, Joseph, March 27	57	Apr. 3
Myers, Wayne S., June 9	47	June 12
O'Day, Daniel, May 31	46	June 5
O'Neil, Stanley S., Jan. 2	32	Jan. 10
Parker, Chas. H., April	78	Apr. 24
Patten, John A., April 25	..	May 1
Rand, Sedley A., Jan. 2	..	Jan. 10
Schneider, Alexander, April 21	63	May 1
Sperry, B. C., Jan. 5	63	Jan. 24
Swift, Thomas T., May 28	..	June 5
Tennent, James C., May 31	64	June 12
Wadhams, E. A., April 18	67	Apr. 24
Wagener, John Henry, Jan. 11	49	Jan. 17
William, Joseph, June	..	June 19
Williams, William C., Feb. 27	78	Mar. 6
Wing, L. Stuart, March 1	52	Mar. 6
Archibold, John Dustin, Dec. 6	68	Dec. 11
Black, John F., July 23	61	July 31
Beecham, Sir Joseph, week of Oct. 23	69	Oct. 30
Bowring, Sir W. B., Bart, Oct. 20	79	Nov. 13
Brydon, Robert, Nov. 23	65	Dec. 4
Burbank, Charles G., December	83	Dec. 25
Chambers, Thomas Preston, week of July 20	80	July 31
Dale, Joseph K., June 26	84	July 3
Dana, Hon. C. S., Aug. 1	52	Aug. 28
Drake, Dr. J. B., July 12	..	July 24
Dyas, Robert T., Sept. 19	76	Sept 25
Emery, Lewis S., week Sept. 10	65	Sept. 18
Ettinger, Charles D., week Sept. 10	78	Sept. 18
Fitzgibbon, William, week Sept. 11	71	Sept. 18
Fraser, Lewis H. D.	38	Nov. 13
Gould, Mrs. Lizzie L., Nov. 18	..	Nov. 27
Gray, William, Dec. 12	54	Dec. 18
Hamilton, Jas. Telford, July 30	..	Aug. 7
Hill, Hiram, July 31	90	Aug. 7
Hoglns, Henry H., Aug. 8	71	Aug. 14
Hoover, Elisha J.	66	July 10
Howard, David, week Nov. 13	..	Nov. 20
Humphries, Forrester,	51	Aug. 14
Jackson, Israel G., Nov.	72	Dec. 4
Lamond, John G., Nov.	47	Dec. 4
Lawrence, William Watson, Aug. 29	57	Sept. 4
Lister, Joseph, July	78	July 24
Magnus, Percy C., Nov. 16	56	Nov. 20
Meiller, Albin, Nov. 27	66	Dec. 4
Mennen, Mrs. Elma C., Oct. 25	..	Oct. 30
Messer, Samuel G., week Oct. 18	61	Oct. 23
Metchnikoff, Prof. Elie, July 15	..	July 24
Michel, C. O., June 30	70	July 24
More, Edgar M., Oct. 12	66	Oct. 16
Newell, John, week Dec. 1	..	Dec. 11
Novak, Charles, week July 31	65	Sept. 4
Ochler, John, July 15	57	July 17
Pitcairn, John, July 22	75	July 31
Purcell, Col. John B., Sept.	67	Oct. 2
Ramsay, Sir William, July 23	65	July 31
Ramsay, Mayor Wm. G., Sept. 28	50	Oct. 2
Raynor, James S., Sept. 27	80	Oct. 9
Rugg, Arthur H., Oct. 19	73	Oct. 23
Salomon, Henry, Dec. 13	..	Dec. 18
Seaward, John F., week Sept. 23	44	Oct. 2
Shepard, Thomas, week Sept. 23	85	Oct. 30
Sherwin, Henry Alden, June 26	74	July 3
Simon, Dr. William, July 19	72	July 24
Sommer, Aldo, Aug. 7	86	Aug. 14
Steel, Francis H., week Dec. 18	..	Dec. 25
Tague, John T., Oct. 10	57	Oct. 16
Tompkins, Commodore Charles H., Oct. 7	83	Oct. 16
Warner, William, Oct.	73	Oct. 30
Wetherill, Christopher L., Dec. 22	45	Dec. 25
Wilbert, Martin I., Nov. 25	51	Dec. 4
Winger, Josiah G., week Oct. 23	72	Oct. 30

PRICE INFLUENCING FACTORS IN WAX, POTASH AND ESSENTIAL OIL MARKETS

What new sources of supply were opened up during the year failed to relieve the scarcity in the available supply of potash which has existed since the outbreak of the war and prices for this important basic material were the highest on record. With virtually nothing available from Germany, holders of the meager stocks were able to mark up their prices to almost prohibitive figures. This situation seriously affected the potash salts, prices moving upward in sympathy with the basic material, and at various times during the year the prices named were largely nominal. Cyanides also were firm, especially in the last quarter of the year, stocks being reduced on account of the forced curtailment in production by one of the largest factors.

Vanilla beans were adversely affected by the shortage in the crop and the disturbed political situation which upset conditions in Mexico. Prices, as a result of these abnormal conditions, were comparatively high. Bourbon vanilla beans were steady in sympathy with the Mexicans. The freight situation was an important factor in this department.

Conditions in the essential oil trade were somewhat better than in 1915, yet with many sources of supply practically cut off by the war, prices in many instances were more or less nominal. Supplies of essential oils coming from countries not in the grip of the war were about normal. A noteworthy increase was recorded in the domestic production of synthetic aromatics, due to the development of the coal-tar industry.

There was an active demand for the waxes, especially from abroad. Since the outbreak of the war the consumption of waxes has increased materially. High prices for crude oil and the shrinkage in the imports developed a strong situation for paraffine wax.

Advertising Spaces and Cost per Insertion

in the

OIL, PAINT AND DRUG REPORTER

Whether you are a buyer or a seller of Chemicals, Drugs, Dyes, Paints, Varnishes, Oils, indeed any of the products in the trades covered by the Oil, Paint and Drug Reporter you would find it to your financial advantage to advertise in the Reporter, the weekly issues of which are consulted by Manufacturers, Importers, Manufacturing Consumers and Wholesale Distributers in all parts of the world.

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Oil, Paint and Drug Reporter, 100 William Street NEW YORK CITY

IMPORTS INTO THE UNITED STATES FOR THE CALENDAR YEARS 1914, 1915 AND 1916.

This Presentation of the Following Import Statistics Covering the Reporter Markets Is the First Compilation of Such Figures to Be Printed, as the Government Figures Have Not as Yet Been Given Out, Except in Some Isolated Markets—The Comparisons for These Three War Years Will B e Found of Unusual Interest and Value.

	1914		1915		1916	
	Quantity.	Dollars.	Quantity.	Dollars.	Quantity.	Dollars.
Acids—						
Carbolic, lbs.	6,920,150	393,611	2,055,790	126,092	1,871,343	131,531
Oxalic, lbs., dut.	8,164,938	423,491	2,059,532	174,290	875,269	421,859
Alizarin and alizarin dyes, lbs., free	4,248,585	1,216,536	3,128,205	827,992	45,224	70,295
Ammonia—						
Muriate of, lbs., dut.	7,841,546	395,456	2,542,592	134,255	1,653,354	123,502
Aniline Salts—						
Dutiable, lbs.	2,244,873	180,905	261,097	65,319	20	4
Asbestos—						
Unmanufactured, tons, free	64,106	1,407,758	83,541	1,981,483	103,716	3,303,470
Aluminum—						
Crude, scraps, etc., lbs., dut.	10,241,340	2,729,383	8,534,834	1,511,988	6,646,385	1,729,208
Manufactures, dut.	.....	1,308,026	.....	301,863	.....	55,864
Asphaltum and bitumen, tons, free	124,214	682,748	123,436	680,357	131,911	735,302
Arsenic, lbs., free	4,709,372	165,266	3,573,624	154,517	2,180,321	124,844
Antimony matte, regulus or metal, lbs., dut.	13,070,381	737,238	17,484,030	3,633,420	19,749,830	5,219,880
Argols or wine lees, lbs., dut.	27,435,509	3,027,996	31,901,215	3,767,875	30,141,032	5,103,606
Barks—						
Cinchona or other from which quinine may be extracted, lbs., free	3,944,509	538,195	4,044,882	596,578	3,917,636	982,071
Quinia, sulphate of and all alkaloids or salts of cinchona bark, ozs., free	2,967,801	703,173	1,442,691	675,619	1,380,001	794,391
Bismuth,* lbs., free	.....	.....	.....	.....	76,723	195,975
Blood, dried,* free	.....	.....	.....	.....	.....	229,026
Bleaching powder, lbs., dut.	34,539,934	332,792	7,564,473	102,570	1,605,036	32,628
Bones, hoofs and horns, unmanufactured, free	.....	1,173,795	.....	638,145	.....	922,567
Bristles—						
Not sorted, bunched or prepared, lbs., free	67,580	23,123	48,767	3,336	123,533	45,241
Sorted, bunched or prepared, lbs., dut.	3,453,018	3,171,186	3,522,505	3,350,801	4,415,612	4,351,527
Brushes, feather dusters and hair pencils, dut.	.....	1,976,547	.....	1,279,637	.....	1,574,963
Candle, pitch, palm and other vegetable stearine,* dut.	.....	.....	.....	.....	.....	16,531
Casein, lbs., free	9,905,675	644,216	7,656,680	514,206	12,319,550	1,570,076
Clays or earths—						
China clay or kaolin, tons, dut.	288,858	1,908,407	186,414	1,151,551	226,632	1,325,647
All other, tons, dut.	69,776	451,807	40,325	267,571	54,585	308,066
All other, tons, free	37,791	218,862	11,359	79,676	2,284	12,137
Chalk*—						
Unmanufactured, tons, free	.....	.....	.....	.....	133,188	112,670
Ground, precipitated, etc., dut.	.....	.....	.....	.....	.....	32,714
Cobalt and cobalt ore and zaffer,* lbs, free	.....	.....	.....	.....	136,870	175,236
Chamois skins, dut.	.....	79,580	.....	55,722	.....	165,969
Coal-tar products—						
Colors or dyes, dut.	.....	6,845,160	.....	3,396,594	.....	4,420,147
Dead or creosote oils, gals, free	48,839,020	3,023,580	34,442,028	2,676,430	46,843,417	3,528,098
All other, free	.....	255,518	.....	288,395	.....	793,649
Cocoa, crude, lbs., free	177,424,800	19,122,852	230,525,001	31,318,876	242,617,054	33,926,029
Cocoa and chocolate prepared or manufactured (except confectionery), lbs., dut.	3,123,904	555,548	2,225,464	579,369	2,293,733	676,437
Cork—						
Wood or bark, unmanufactured, free	.....	3,737,137	.....	2,411,521	.....	3,509,934
Manufactures of, dut.	.....	2,690,503	.....	1,313,524	.....	1,504,916
Cocoanut meat, broken or copra—						
Not shredded, desiccated or prepared, lbs., free	60,076,664	2,764,463	108,294,331	3,756,526	162,370,903	7,735,048
Shredded, desiccated or prepared, lbs., dut.	8,412,485	642,856	4,447,177	289,188	10,886,546	918,969
Dyewood in a crude state—						
Logwood, tons, free	40,862	522,434	60,958	832,196	186,816	6,097,576
All other, tons, free	8,100	122,651	23,166	357,903	15,076	340,727
Extracts and decoctions for dyeing or tanning—						
Quebracho, free, lbs.	114,326,433	3,100,378	82,182,141	3,145,519	67,088,978	5,323,096
Fertilizers—						
Ammonia sulphate, tons, free	74,121	4,475,603	32,477	1,934,625	12,962	954,815
Bone dust and bone ash, tons, free	30,022	890,672	21,322	540,197	18,124	487,857
Guano, tons, free	25,562	762,688	9,974	220,866	12,997	378,109
Kainit, tons, free	329,611	1,350,879	6,674	95,440	36	1,173
Ferromanganese,* tons, free	.....	.....	.....	.....	90,928	9,240,528
Ferrosilicons, tons, dut.	6,146	341,929	5,226	310,130	6,739	384,258
Manure salts, tons, free	168,426	1,842,649	13,947	207,674	1,164	21,273
Potash, n. e. s.—						
Muriate of, tons, free	168,509	5,740,893	57,744	2,297,149	1,161	348,961
Sulphate of, tons, free	36,264	1,568,704	11,344	663,399	1,514	81,684
All other substances used as fertilizers	.....	5,055,035	.....	2,922,914	.....	3,223,724
Fish sounds,* lbs., free	.....	.....	.....	.....	446,645	102,033
Fluorspar,* tons, dut.	.....	.....	.....	.....	10,490	52,976
Gelatine, unmanufactured, lbs., dut.	2,541,464	749,267	2,613,250	820,968	1,031,659	282,903
Manufactures of	.....	37,721	.....	70,373	.....	44,489
Glass and glassware—						
Bottles, vials, demijohns (except blown), dut.	.....	1,064,371	.....	657,299	.....	865,437
Bottles, decanters and other glassware, cut or ornamental, dut.	.....	768,773	.....	361,546	.....	295,244
Cylinder, crown and common window glass, unpolished, lbs., dut.	34,868,782	1,316,902	2,808,891	283,002	3,207,681	350,742
Lenses, and all optical instruments (including spectacles), dut.	.....	494,987	.....	172,963	.....	159,749
Plate, cast, polished, unsilvered, sq. ft., dut	2,111,096	489,359	15,865	7,305	11,809	10,160
Plate or disks, rough cut or unwrought for optical instruments, free	.....	575,747	.....	387,331	.....	253,853
All other, dut.	.....	2,153,881	.....	1,035,590	.....	479,049
Glaziers', engravers' and miners' diamonds, unset,* free	.....	.....	.....	.....	.....	840,735
Glue and glue size, lbs., dut.	20,652,395	1,636,730	6,533,921	596,974	2,063,564	184,371
Glycerine, crude, lbs., dut.	24,787,168	3,122,848	15,616,900	1,976,332	7,026,044	2,079,196
Grease and oils, n. e. s.—						
Sulphur oil or olive foots, lbs., free	13,043,410	852,063	10,950,237	777,951	14,245,773	1,251,729
All other, lbs., free	11,664,636	529,833	17,678,877	645,066	9,580,097	433,977
Gums—						
Camphor, crude, natural, lbs., dut.	3,488,271	349,701	3,712,328	989,923	5,654,281	1,570,735
Camphor, refined and synthetic, lbs., dut.	1,054,177	369,476	1,205,287	390,266	3,011,072	1,190,498
Chicle, lbs., dut.	5,896,556	2,178,053	7,916,893	2,903,018	7,250,336	3,198,153
Copal, kauri and damar, lbs., free	28,647,148	2,963,467	32,227,509	2,772,833	42,843,328	3,680,361
Gambier or terra japonica, lbs., free	13,706,205	493,634	9,663,963	461,042	13,780,160	1,042,342
Shellac, lbs., free	19,636,790	3,026,819	26,845,107	3,010,290	31,132,320	5,075,885
All other, free	.....	1,172,008	.....	1,027,111	.....	1,477,144
All other, dut.	.....	827,988	.....	576,848	.....	930,646
Lime, citrate of, lbs., dut.	4,358,752	725,262	6,310,327	1,113,569	8,542,880	1,982,823
Magnesite, calcined, not purified, lbs., free	241,165,822	1,297,835	55,146,407	399,866	18,539,704	204,183
Manganese, oxide and ore of, tons, free	283,294	2,024,120	320,783	2,623,286	576,321	8,666,179
Matches, friction or lucifer, dut.	.....	911,399	.....	653,529	.....	1,543,328
Mica—						
Unmanufactured, lbs., dut.	845,904	204,850	779,922	244,292	1,151,494	471,204
Cut, split, etc.,* dut.	.....	.....	.....	.....	.....	655,067
Nickel ore and matte (nickel contents), lbs., free	35,006,770	4,956,448	56,352,582	7,615,900	72,611,492	9,869,122
Oilcake,* lbs., free	.....	.....	.....	.....	44,913,239	522,502
OIL—						
Animal—						
Cod and codliver, gls., free	1,893,103	683,780	1,613,850	760,780	1,463,014	1,187,786
All other, gls., dut.	1,459,139	463,538	1,243,318	411,773	3,116,635	1,251,650
Mineral—						
Crude, gls., free	710,351,077	10,023,097	761,852,180	10,387,553	873,468,233	12,374,286
Refined—						
Benzine, gasoline and naphtha, gls., free	12,751,279	1,120,633	1,146,678	38,756	2,703,375	185,286
All other, gls., free	1,344,553	357,000	706,840	137,319	14,682,142	1,127,711
Vegetable—						
Expressed—						
Chinese nut, gls., free	4,018,254	1,502,710	4,530,091	1,483,515	7,686,593	3,977,141
Cocoa butter or butterine, lbs., dut.	1,244,144	348,516	24,561	7,866	558,148	181,952
Cocoanut, lbs., free	58,012,425	5,147,154	63,105,102	5,334,271	67,349,308	6,816,685
Cottonseed, lbs., free	16,016,557	869,297	11,675,427	488,241	16,597,785	954,714
Flaxseed or linseed, gls., dut.	580,055	263,339	88,462	49,875	103,753	71,206
Olive, fit only for manufacturing, free	747,917	474,611	631,501	438,628	844,595	681,423
Olive, edible, gls., dut.	6,780,936	8,421,490	6,872,969	8,781,458	7,982,353	10,407,608
Palm, lbs., free	49,092,150	3,155,054	34,399,130	2,169,268	29,270,063	2,457,376
Palm, kernel, lbs., free	21,089,142	1,869,063	5,312,367	391,813	4,323,735	412,707
Peanut, dut., lbs.	982,059	674,787	834,581	550,814	2,089,801	1,173,846
Rapeseed, gls., dut.	1,489,544	732,303	1,545,739	857,302	2,690,755	1,508,604
Soya bean, lbs., free	12,554,948	657,231	21,336,213	931,791	145,409,269	8,212,738
All other, free	.....	19,351	.....	7,988	.....	70,557
All other, dut.	.....	325,093	.....	145,404	.....	561,845
Distilled and essential—						
Birch tar and cajeput,* free	.....	.....	.....	.....	.....	13,266
Lemon, lbs., dut.	486,371	896,541	476,161	418,588	623,831	493,610
All other, dut.	.....	2,062,724	.....	2,396,084	.....	2,815,016
All other, free	.....	26,402	.....	11,864	.....	.....
Paraffine* (not including oil), lbs., free	4,029,657	348,483	1,718,473	153,987	9,258,115	510,699
Oleo stearine, lbs., free	.....	.....	.....	.....	576,427	46,379
Opium, containing 9 per cent. and over of morphia, lbs., dut.	415,990	1,976,497	351,955	1,735,425	90,608	648,063
Paint, pigments and varnishes, dut.	.....	2,252,837	.....	1,566,340	.....	2,248,645
Perfumeries, cosmetics and all other preparations, dut.	.....	2,259,910	.....	2,699,988	.....	3,371,363
Plaster rock or gypsum, crude,* tons, dut.	.....	.....	.....	.....	237,356	347,385
Platinum, unmanufactured, ozs., troy, free	32,111	1,154,955	55,729	2,077,536	41,236	2,506,531
Plumbago, tons, free	19,645	1,398,261	20,605	2,241,163	38,408	7,279,884
Potash (see also fertilizers)—						
Carbonate of, lbs., free	15,890,974	483,899	9,434,590	318,308	2,992,753	262,878
Cyanide of, lbs., free	1,245,565	79,714	872,207	134,210	2,705	806
Hydrate of, containing not more than 15 per cent. of caustic soda, lbs., free	.....	.....	2,037,942	100,369	48,700	16,754
Nitrate of, or saltpeter, crude, lbs., free	2,220,866	74,743	127,270	28,095	11,537,033	1,519,373
All other, lbs., dut.	5,214,415	481,770	2,214,261	282,701	170,064	106,083
Preparations, medicinal, dut.	.....	785,105	.....	245,500	.....	392,629
Pumice stone,* tons, dut.	.....	.....	.....	.....	7,627	33,200
Rottenstone and tripoli,* free	.....	.....	.....	.....	.....	104,887
Rennets,* free	.....	.....	.....	.....	.....	34,681
Salt, 100 lbs., free	2,615,046	385,752	2,471,520	366,475	2,439,239	342,588
Seeds—						
Castor beans or seeds, bu., dut.	928,322	1,022,074	855,315	933,628	1,034,822	1,560,122
Flaxseed, or linseed, bu., dut.	9,246,530	12,084,970	14,696,623	18,638,658	13,098,004	20,438,804
Grass—						
Clover—						
Red, lbs., free	5,404,756	700,665	13,302,105	1,713,371	2,098,084	280,314
All other, lbs., free	19,236,991	1,535,008	10,278,593	963,663	10,773,900	1,267,634
All other grass seeds, lbs., free	33,164,381	1,427,458	24,980,446	1,074,916	10,204,444	967,628
Sugar beet, lbs., free	17,000,000	1,591,147	4,029,022	404,991	19,024,820	1,988,247
All other seeds—						
Free	.....	1,807,321	.....	2,471,813	.....	3,140,608
Dutiable	.....	1,334,332	.....	1,360,534	.....	1,238,317
Soaps—						
Castile, lbs., dut.	4,288,984	344,911	3,522,342	310,687	2,737,827	326,469
All other, dut.	.....	848,358	.....	282,189	.....	209,741
Soda—						
Cyanide, free, lbs.	2,423,171	366,623	4,178,056	650,559	483,811	102,063
Nitrate of, tons, free	543,175	15,228,671	772,190	22,959,997	1,218,423	38,131,982
All other salts, free	.....	25,658	.....	30,771	.....	60,146
All other salts of, dut., lbs.	.....	628	.....	419,612	.....	724,178
Spices—						
Unground—						
Cassia and cassavera, dut., lbs.	6,261,851	370,114	6,288,260	339,948	10,724,813	753,861
Ginger root, not preserved, lbs., dut.	3,528,142	152,324	4,329,569	226,904	6,079,503	477,289
Pepper, black or white, lbs., dut.	25,297,726	2,475,998	33,586,661	3,427,205	32,605,823	4,400,211
All other, lbs., dut.	19,571,958	2,280,152	22,498,013	2,432,062	27,840,795	3,535,419
Sponges, dut.	.....	164,267	.....	510,443	.....	605,592
Starch, lbs., dut.	11,263,811	280,356	2,556,151	97,339	5,538,309	260,583
Sulphur ore as pyrites or sulphuret or iron containing in excess of 25 per cent. of sulphur, tons, free	977,372	4,706,383	974,616	4,817,977	1,244,519	6,728,318
Sulphur or brimstone, crude, tons, free	22,810	409,537	24,647	403,980	21,510	364,787
Talc, ground or prepared,* lbs., dut.	.....	.....	.....	.....	33,864,896	218,180
Sumac, ground or unground, lbs., free	1,532,586	337,207	14,533,174	348,549	17,454,996	472,390
Tanning materials, crude—						
Mangrove bark, tons, free	5,568	149,842	15,807	411,490	20,014	565,805
Quebracho wood, tons, free	71,988	919,120	81,251	1,182,152	79,048	1,205,398
All other, free	.....	455,575	.....	479,743	.....	932,863
Vanilla beans, lbs., dut.	835,271	2,183,510	901,133	1,442,674	801,922	1,734,905
Tar and pitch of coal,* bbls., free	.....	.....	.....	.....	27,716	41,827
Tea waste, siftings or sweepings for manufacturing purposes,* lbs., dut.	.....	.....	.....	.....	5,802,433	282,267

Hide cuttings, raw, and other glue stock, lbs.,† free	.....	2,081,072	.....	1,048,375	27,497,835	1,104,486
Hops, lbs., dut.	7,482,519	2,584,695	767,160	1,540,533	630,669	144,700
Ivory—						
Animal, lbs., dut.	318,040	865,715	363,472	790,711	672,441	1,467,898
Vegetable (tagua nut), lbs., free	22,597,301	612,768	23,166,280	568,605	42,623,663	1,176,388
Lead in pigs, bars and old, lbs., dut.	296,846	10,082	819,282	28,154	11,310,817	761,537
Human hair, unmanufactured—						
Uncleaned, lbs., dut.	566,626	389,841	725,477	267,673	1,112,200	555,464
Manufactured, cleaned, dut.	.....	181,005	.....	208,536	.....	452,202
All other, dut.	.....	87,311	.....	103,175	.....	81,726
Indigo, natural and synthetic, lbs., free	7,927,151	1,188,795	7,332,953	4,078,428	222,295	425,778
Iodine, crude, lbs., free	463,333	951,308	612,936	1,332,387	2,033,068	5,158,265
Licorice root—						
Dutiable, lbs.	103,224,650	1,871,863	51,049,615	1,244,763	59,132,314	2,321,281
Indigo, synthetic*	.....	.....	.....	.....	141,990	121,260
Iron, chromate of, tons, free	74,686	655,306	76,455	780,061	115,886	1,548,402
Lime,* 100 lbs., dut.	.....	.....	.....	.....	159,317	71,663

Wax—						
Beeswax,* lbs., free	.....	.....	.....	.....	1,955,046	556,074
Mineral, lbs., free	6,812,270	424,030	2,845,304	214,495	3,047,834	200,377
Vegetable, lbs., free	5,159,598	1,098,720	6,555,969	1,088,278	7,995,825	1,340,568
All other chemicals and drugs, dyes, etc.—						
Free	.....	4,473,821	.....	6,468,202	.....	11,172,494
Dutiable	.....	8,199,317	.....	6,055,310	.....	7,633,421
Tin in bars, blocks, pigs or grain or granulated, lbs., free	95,049,612	32,861,188	115,636,332	38,736,909	138,073,293	51,803,384
Turpentine, spirits of,* gls., free	.....	.....	.....	.....	28,652	13,637
Zinc and manufactures of—						
Ores and calamines—						
Zinc contents, lbs., dut.	24,624,084	382,743	111,337,046	4,510,546	296,203,168	12,121,385
In blocks or pigs, and old, lbs., dut.	1,759,579	71,165	1,808,964	131,468	1,368,560	119,000
Dust, lbs., dut.	4,004,107	218,338	1,712,373	179,825	1,867,702	333,344

* Not separately stated prior to 1916.
† Quantity not stated prior to 1916.

EXPORTS FROM THE UNITED STATES FOR THE CALENDAR YEARS 1914, 1915 AND 1916.

	1914		1915		1916	
	Quantity.	Dollars.	Quantity.	Dollars.	Quantity.	Dollars.
Alcohol, including pure, neutral or cologne spirits, pf. gls.	155,647	66,799	363,769	174,830	60,185,160	19,560,543
Alcohol, wood, gls.	1,160,721	479,121	1,224,496	632,242	1,242,829	814,252
Asbestos—						
manufactures of	.....	513,037	.....	764,050	.....	1,209,076
Ore and unmanufactured,* tons	.....	.....	.....	.....	279	6,133
Asphaltum—						
Unmanufactured, tons	37,246	845,838	38,163	735,952	36,403	759,769
Manufactures of	.....	401,182	.....	478,685	.....	494,895
Beeswax,* lbs.	.....	.....	.....	.....	235,643	85,380
Bark, for tanning,* tons	.....	.....	.....	.....	4,742	113,166
Baking powder, lbs.	2,857,902	778,632	3,543,591	856,299	4,544,881	932,363
Bark, extract of, for tanning	.....	1,084,088	.....	4,163,352	.....	5,593,524
Bauxite, concentrates, tons	5,374	240,084	16,062	717,186	18,032	987,454
Brushes	.....	399,151	.....	962,647	.....	.....
Calcium, carbide, lbs.	32,750,820	988,641	37,379,995	1,154,962	40,862,419	1,288,938
Candles, lbs.	3,153,244	307,660	5,301,433	497,333	6,465,843	632,961
Celluloid and manufactures of	.....	1,108,503	.....	1,402,044	.....	2,626,685
Cement, hydraulic, bbls.	2,140,197	3,088,809	2,564,713	3,361,451	2,563,976	3,828,231
Chalk*	.....	.....	.....	.....	.....	103,995
Charcoal*	.....	.....	.....	.....	.....	94,425
Chemicals, drugs, dyes and medicines—						
Acids—						
Sulphuric, lbs.	13,175,796	140,375	77,812,029	998,124	66,463,501	1,847,995
All other	.....	619,591	.....	9,055,875	.....	43,167,469
Copper, sulphate of, lbs.	7,387,236	327,967	13,952,839	680,541	19,469,565	2,803,833
Dyes and dyestuffs	.....	537,539	.....	2,511,065	.....	7,754,250
Ginseng, lbs.	155,029	1,265,390	210,415	1,539,161	261,705	1,735,187
Lime, acetate of	47,896,901	832,526	19,676,874	562,862	17,192,090	1,034,664
Medicine, patent or proprietary	.....	6,520,553	.....	8,109,067	.....	8,292,964
Petroleum jelly, etc.	.....	639,848	.....	1,034,256	.....	1,241,144
Roots, herbs and barks, not mixed	.....	410,055	.....	753,661	.....	647,182
Soda, salts and preparations	.....	734,908	.....	7,114,205	.....	17,003,998
Sulphur or brimstone, crude, tons	98,153	1,807,225	37,312	732,697	128,755	2,505,957
Washing powder and fluid, lbs.	12,683,223	333,060	12,901,710	584,355	5,048,843	236,057
All other	.....	11,287,208	.....	39,923,700	.....	68,385,141
Chewing gum*	.....	.....	.....	.....	.....	942,511
Clays—						
Fire,* tons	.....	.....	.....	.....	40,850	144,552
All other,* tons	.....	.....	.....	.....	24,808	153,163
Coal tar,* bbls.	.....	.....	.....	.....	48,558	96,219
Cocoa and chocolate, prepared or manufactured (except confectionery)	.....	635,879	.....	2,186,873	.....	2,013,531
Dynamite, lbs.	11,303,815	1,213,600	11,446,368	1,502,450	18,681,285	4,173,175
Egg yolk, canned eggs, etc*	.....	.....	.....	.....	.....	79,237
Ferrovanadium, lbs.	770,079	640,948	840,265	741,085	2,031,027	2,035,276
Fertilizers—						
Phosphate rock, ground or unground, not acidulated—						
High grade hard rock, tons	281,806	2,618,060	34,322	334,954	28,631	286,948
Land pebble, tons	618,241	3,948,079	218,620	1,269,789	214,358	865,078
All other, tons	1,067	5,513	357	4,326	854	8,915
All other fertilizers, tons	63,554	1,311,227	113,965	2,778,916	149,121	5,007,967
Flavoring extracts and fruit juices*	.....	.....	.....	.....	.....	573,800
Fly paper*	.....	.....	.....	.....	.....	69,903
German silver*	.....	.....	.....	.....	.....	337,680
Glass and glassware—						
Bottles, vials, demijohns, carboys and jars	.....	651,747	.....	1,301,460	.....	2,491,366
Cylinder, crown and common window glass, boxes (50 sq. ft.)	.....	405,196	686,997	2,303,873	1,169,142	4,158,705
Plate glass, sq. ft.	562,434	193,874	5,054,269	1,497,533	5,604,433	1,868,117
All other	.....	2,285,894	.....	3,956,357	.....	5,941,383
Glucose, lbs.	127,209,069	2,886,189	151,643,990	4,107,547	136,379,198	3,295,823
Glue, lbs.	2,248,252	242,582	2,775,160	385,696	5,147,000	586,188
Grape sugar, lbs.	35,681,124	775,036	36,838,296	945,290	38,684,528	993,478
Graphite—						
Unmanufactured, lbs.	3,920,693	277,386	1,065,704	53,016	1,597,550	98,488
Manufactures of	.....	215,878	.....	536,662	.....	1,338,889
Grease—						
Lubricating	.....	2,058,364	.....	3,272,942	.....	3,546,816
Soap stock and other	.....	4,420,766	.....	4,064,434	.....	3,045,921
Gunpowder, lbs.	866,569	289,893	83,884,703	66,346,770	316,010,613	263,423,149
Hoofs, horns and horn tips, strips and waste	.....	28,914	.....	29,316	.....	39,673
Hops, lbs.	11,056,449	2,926,401	20,864,837	4,797,994	13,505,655	2,113,776
Ink—						
Printers'	.....	421,086	.....	436,999	.....	793,777
All other	.....	152,497	.....	202,127	.....	344,905
Instruments and apparatus for scientific purposes—						
Medical and surgical instruments	.....	.....	.....	626,801	.....	453,233
Optical instruments	.....	.....	.....	1,725,065	.....	3,252,247
All other	.....	.....	.....	1,299,908	.....	3,638,344
Iron in pigs, tons	114,423	1,638,102	224,490	3,666,966	612,241	13,517,085
Lard, lbs.	438,015,898	48,610,269	451,053,321	48,340,868	426,659,599	56,039,641
Lard, compounds and other substitutes for lard, lbs.	63,355,911	5,686,980	63,567,383	5,519,039	49,821,709	5,930,841
Lard, neutral, lbs.	21,797,521	2,429,926	35,386,318	4,006,840	27,314,774	3,687,236
Lead, manufactures of—						
Pigs and bars—						
Produced from domestic ore, lbs.	.....	.....	174,177,577	7,797,006	200,930,639	13,508,203
Produced from foreign ores, lbs.	.....	.....	41,783,126	1,663,326	19,305,109	1,078,970
All other manufactures of	.....	.....	.....	2,270,859	.....	2,508,278

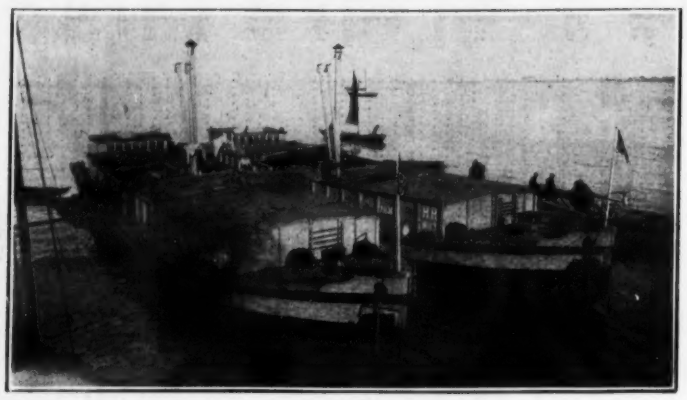
	1914		1915		1916	
	Quantity.	Dollars.	Quantity.	Dollars.	Quantity.	Dollars.
Lime,* bbls.	.....	.....	.....	.....	239,725	132,769
Malt,* bushels	.....	.....	.....	.....	5,102,729	5,826,164
Metal polish*	.....	.....	.....	.....	.....	217,315
Mica, unmanufactured,* lbs.	.....	.....	.....	.....	63,168	4,544
Mucilage*	.....	.....	.....	.....	.....	29,964
Nickel, nickel oxide and matte, lbs.	27,595,152	9,455,528	26,418,550	10,038,514	33,404,011	12,952,493
Oakum,* lbs.	.....	.....	.....	.....	1,294,100	118,207
Oil cake and oil cake meal—						
Corn, lbs.	59,076,805	904,561	31,137,289	562,889	21,302,208	346,004
Cottonseed cake, lbs.	467,401,631	5,746,255	1,292,742,008	17,524,319	1,027,345,871	16,556,246
Cottonseed meal, lbs.	151,684,173	2,085,461	165,707,667	2,296,349	204,594,620	3,458,519
Linseed, lbs.	509,415,386	7,978,743	606,356,587	10,764,834	667,645,566	12,388,607
All other, lbs.	11,211,008	130,207	17,771,393	212,215	30,252,835	504,675
Oil—						
Animal—						
Fish (except whale), gls.	135,196	46,880	134,500	54,575	127,218	67,326
Lard, gls.	102,229	81,087	351,284	210,015	357,076	299,865
All other, gls.	613,279	413,708	636,772	457,137	560,855	467,315
Oleo, lbs.	85,144,527	8,918,130	109,395,763	13,011,789	83,891,672	11,431,632
Oleomargarine, lbs.	2,292,000	246,914	6,774,278	783,321	6,309,330	882,797
Vegetable—						
Corn, lbs.	16,203,673	1,127,146	16,942,737	1,309,873	9,118,812	911,865
Cottonseed, lbs.	216,308,961	14,683,796	352,623,678	23,245,317	188,213,816	19,390,435
Linseed, gls.	265,781	154,317	1,358,599	735,697	324,052	608,828
All other	.....	393,263	.....	1,839,796	.....	2,897,644
Volatile—						
Peppermint, lbs.	119,037	309,450	196,648	463,027	145,278	310,459
All other essential	.....	228,736	.....	601,818	.....	939,088
Mineral—						
Crude (including all natural oils without gravity), gls.	124,735,553	4,958,838	158,263,069	4,282,827	172,029,903	7,030,923
Refined or manufactured—						
Illuminating, gls.	1,010,449,253	64,112,772	836,996,731	49,957,273	854,403,313	55,845,103
Lubricating and heavy paraffine oils, gls.	191,647,660	26,816,313	239,719,488	32,441,794	260,779,127	43,022,468
Naphthas and all lighter products of distillation—						
Gasoline, gls.	162,669,038	19,897,613	169,770,999	20,762,589	167,928,262	33,614,957
All other, gls.	47,023,617	5,390,801	112,560,475	13,141,390	188,288,863	35,055,589
Residuum (including tar and all other from which the light bodies have been distilled)—						
Gas oil and fuel oil, gls.	634,297,337	18,019,333	799,646,145	22,010,438	957,518,417	27,002,087
All other, gls.	d9,209,777	1,204,917	12,616,712	364,351	6,543,324	161,436
Paints, pigments and varnishes—						
Dry colors—						
Lampblack	.....	389,081	.....	392,997	.....	784,232
All other	.....	684,222	.....	1,448,582	.....	1,605,737
Ready mixed paints, gls.	771,879	974,400	906,126	1,125,351	1,081,306	1,470,203
Varnish, gls.	863,363	834,320	820,208	735,208	823,179	491,203
White lead, lbs.	17,645,538	1,017,376	25,313,239	1,409,713	27,435,054	2,137,072
Zinc, oxide of, lbs.	31,183,369	1,408,525	39,960,899	2,066,992	27,923,712	2,394,739
All other (including crayons)	.....	1,595,651	.....	2,156,876	.....	4,177,433
Paraffine and paraffine wax, lbs.	188,822,971	6,434,831	386,863,193	12,552,520	376,892,904	14,820,440
Paste*	.....	.....	.....	.....	.....	356,455
Perfumeries, cosmetics and all toilet preparations	.....	1,513,816	.....	2,183,426	.....	3,526,195
Plaster of paris*	.....	.....	.....	.....	.....	13,076
Quicksilver, lbs.	108,426	70,753	252,852	225,500	666,027	670,475
Rosin, bbls (280 lbs.)	1,748,500	8,068,224	1,382,537	6,597,614	1,842,313	11,325,831
Salt, lbs.	164,589,012	586,055	160,948,389	613,850	168,129,201	567,441
Seeds—						
Cotton, lbs.	10,965,792	144,097	2,063,034	38,930	1,530,790	26,371
Flaxseed or linseed, bushels	23,684	42,112	5,064	11,329	1,640	4,804
Grass—						
Clover, lbs.	6,659,971	1,114,733	9,427,258	1,324,687	6,049,990	1,104,240
Timothy, lbs.	13,548,907	826,769	17,543,596	1,250,379	12,428,140	854,382
All other, lbs.	4,666,000	527,194	3,679,694	372,315	4,120,644	436,106
All other seeds	.....	578,873	.....	717,829	.....	771,628
Soap—						
Toilet or fancy	.....	1,801,226	.....	2,330,225	.....	2,455,727
All other, lbs.	59,514,401	2,863,323	75,006,903	3,578,053	69,797,549	3,660,354
Spermaceti and spermaceti wax,* lbs.	.....	.....	.....	.....	112,338	19,946
Spices*	.....	.....	.....	.....	.....	296,538
Sponges, lbs.	166,551	139,580	149,411	137,497	195,799	177,550
Starch, lbs.	62,023,590	1,484,647	178,635,301	5,031,963	202,220,751	5,295,145
Stearine, vegetable,* lbs.	.....	.....	.....	.....	1,411,174	167,589
Stearine from animal fats, lbs.	3,239,469	279,859	16,870,824	1,048,421	13,216,590	1,053,063
Surgical appliances (not including instruments)	.....	2,661,729	.....	4,059,748	.....	2,904,584
Tallow, beef	9,980,066	621,296	26,568,063	1,902,189	15,338,057	1,573,196
Tar, turpentine and pitch, bbls (280 lbs.)	.....	419,331	511,300	286,157	76,690	366,637
Turpentine, spirits of, gls.	11,118,379	5,188,509	10,624,031	4,844,243	9,543,633	4,596,475
Vulcanized fiber and manufactures of	.....	651,875	.....	459,888	.....	794,876
Zinc and manufactures of—						
Ore, tons	9,920	388,464	743	35,276	70	3,992
Dross, lbs.	5,051,067	240,944	8,335,417	507,432	96,575	10,801
Pigs, bars, plates and sheets—						
Produced from domestic ore, lbs.	.....	.....	25,303,584	4,010,369	295,282,103	45,803,453
Produced from foreign ore, lbs.	.....	.....	14,814,410	2,086,301	86,457,195	8,080,033
Plates and sheets, lbs.	.....	.....	81,551,212	13,607,854	30,992,923	5,509,537
All other manufactures of	.....	210,974	.....	16,063,493	.....	572,286

* Not separately stated prior to 1916.

L. C. GILLES

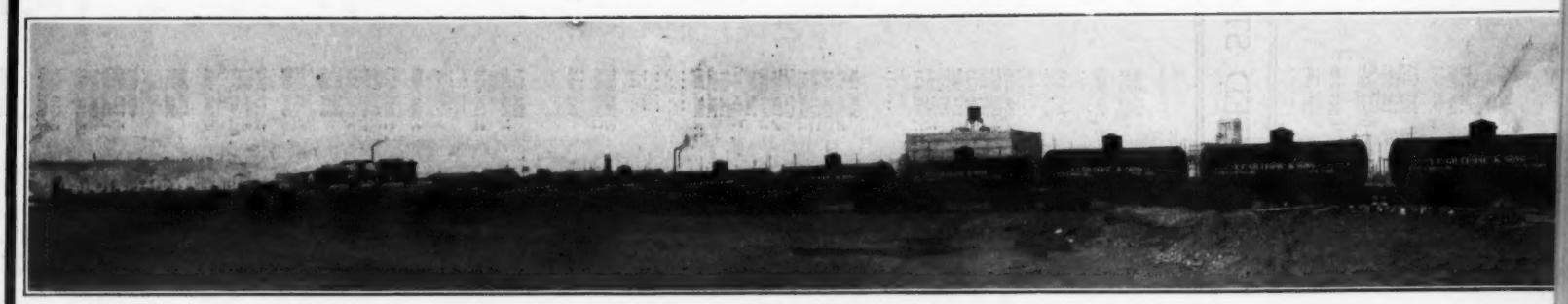
6 and 8 Fletcher Street,

Additional facilities for



Two of our four new modern lighters for transporting China Wood Oil on the Yangtze Kiang River

Our Steamship Javary being loaded at Hankow with a complete cargo of our bulk and barrel China Wood Oil for Tacoma, Wash.



1000-ton shipment China Wood Oil in solid train of twenty-nine tank cars

Official Statistics of shipments of

CHINA WOOD OIL

from Hankow, China, to the United States during year ending December 31, 1916:

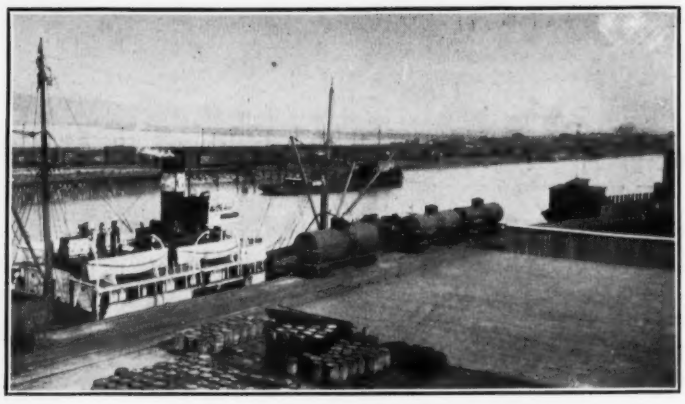
L. C. GILLESPIE & SONS,	62,800	barrels
All others (11 shippers)	81,184	"
Total - - -	144,984	barrels

Oldest and largest handlers of this article in the world.
Guarantee absolute purity

PIE & SONS

NEW YORK

handling CHINA WOOD OIL



Discharging barrel and bulk China Wood Oil at Tacoma, Washington

Our own storage and shipping plant on Milwaukee docks, Tacoma, Wash. Showing tanks in course of construction a year ago.

Largest rail shipment of this article ever moved

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Varnish Gums
and Gum Shellac

Our branch houses in the primary markets buy, pack and ship exclusively to us

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SODA ASH
DYE STUFFS
INTERMEDIATES

COAL TAR PRODUCTS

PAINT and VARNISH MATERIALS
RUBBER MATERIALS

NAVAL STORES
FISH OILS
CREOSOTES

(We supply manufacturers with raw materials, and also sell their entire finished products)

Manufacturers

EXPORTERS and IMPORTERS

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